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# Developing Agritourism in the Caribbean: Critical Ethnography and Sustainable Landscape Design to Improve the Human Experience at Letan Bossier, Haiti

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DEVELOPING AGRITOURISM IN THE CARIBBEAN:  
CRITICAL ETHNOGRAPHY AND SUSTAINABLE LANDSCAPE DESIGN TO  
IMPROVE THE HUMAN EXPERIENCE AT LETAN BOSSIER, HAITI

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Master of Landscape Architecture

in

The Robert Reich School of Landscape Architecture

by  
Kristen Maria Lonon  
B.L.A, Louisiana State University, 2011  
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It is with great enthusiasm that I thank the thesis committee for their patience and guidance through this process. Academic advisor, Dr. Austin Allen, has been an invaluable asset in navigating the landscape design process, both locally and internationally. I enrolled in his design studio offered immediately after the January 2010 Earthquake in Haiti, and saw this as not only a refreshing opportunity to contribute to meaningful design in the place that needed it most, but also as the beginning of my career in disaster recovery and culturally sensitive design. The link between Louisiana and Haiti is strong, not only historically, but in my own life, and I owe discovery of this connection to Dr. Allen, who introduced me to advisor, Dr. Joyce Marie Jackson, Professor of Anthropology and African and African American Studies.

I have since returned to Haiti twice with Dr. Jackson, to aid in her research, and to navigate governmental and social structures in order to strengthen and sustain the relationship between Louisiana and Haiti, in both physical and transcendental ways. I accompanied her to the Letan Bossier Community, the site chosen for this thesis project, on 2 separate trips, as our critical ethnographic research, reporting, and relationship building are only the beginning of future manifestations in the form of viable design solutions, facilitation of public exposure, and long term investment. Lastly, none of this would be possible without advisor, Prof. Carl Motsenbocker, of the LSU School of Plant, Environmental, and Soil Sciences, who has not only been on the ground working with the leaders of this community to deliver plants and make them aware of sustainable practices, but has helped to prepare Dr. Jackson and I to better understand the project that we were undertaking. To the advisory committee, faculty of the Landscape Architecture department, and administration, thank you for your investment in the greater cause of education.

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## **ABSTRACT**

The Letan Bossier, Haiti community is in need of continued investment from international agencies, in an effort to improve conditions for locals, along with shaping the experience of the tourist, at and around an attractive natural basin, three miles north-west of Cayes-Jacmel, Haiti, at about 187 meters above sea level. In order to improve one's journey through this mountainside community to the Grand Basin, capital investments must be made. The goal of the proposed design solutions is to solve for the locals first, in turn, attracting tourists to experience a space that's supported by its own people. The goal of this report is to educate involved government entities, local stakeholders, and outside investors of physical and socio-economic needs within the Letan Bossier community, for the purpose of practical design application and administrative changes necessary to sustain local well-being, social balance, and structural integrity throughout the research and design development process.

Local accountability, water management, safe access, and reforestation have been identified in the qualitative research process as top issues to address in order to make Letan Bossier an economically competitive agricultural tourism attraction, as it's being envisioned by investors at this time. Reporting issues highlighted by the local community will promote cultural and environmental sustainability at the forefront of a government backed effort. Here, local and international visitors are invited to experience natural wonders like the Grand Basin of Letan Bossier, the breathtaking views of the Caribbean on the way, the natural mango grove and sugarcane surrounding the basin, and a cutting-edge agricultural education from community leaders, addressing maintenance, nutritional and medicinal farming issues. The locals of Letan Bossier are the keepers of the community and specifying that role will strengthen the sustainability of the site. This sense of ownership is believed to be the first and most important step in the making of a socially, economically, and structurally sustainable community.

## CHAPTER 1: PROJECT INTRODUCTION

### 1.1 PAST / MISSION

#### 1.1.1 Critical Ethnography

Haiti is a land of rich culture and perseverance, and given the aftermath of the 2010 Earthquake and Cholera outbreak, deserves to have design solutions to common problems, which not only meet the needs of visitors, but first serve the people who serve the country on a daily basis. According to the American Anthropological Society, a central concern of those who study people is application of solutions for problems discovered during the research process. Although sociocultural anthropology is the most applicable cannon for field research in the design process, the research itself could lack in practical information to reach said solutions. Ethnographic field research aims to immerse the researcher in the environment of study, but as the design process is long and multi-disciplinary, building of relationships, background information, and future direction of all information gathered is the most thorough way to uncover layers of the landscape and its people. Ethnographic work goes beyond reporting events and details of experience. Specifically, it attempts to explain how these represent layers of meaning and the cultural constructions of which we live and work. This type of on the ground, qualitative research is expanded to what is referred to as Critical Ethnography, when we constantly ask the questions that lead to a more mature analysis and reflection on the subject studied, in turn, reaching more sustainable solutions. Critical ethnography comes into play when conditions are not as they should be and the researcher makes an attempt to facilitate change by making a positive contribution in collaboration with persons affected. Critical ethnography disrupts the status quo and brings to light underlying operations of power and control like the government and large corporations.

Critical Ethnography is a vital part of researching a community, and should begin immediately after educating oneself on the place of study and its people, in preparation to immerse into a new culture, or even a familiar one. Landscapes have history, and the people of the land usually are the keepers and culture bearers of that story. Landscape Architecture is directly informed by connecting to the client, or in the case of this design thesis, the rural mountain community of Bossier, Haiti. The journey up to Bossier from the main

roadway is a memorable one for the visitor, and ends in a large watershed basin called Étang Bossier in French, but will be referred to by its Haitian name, Letan Bossier, for the duration of this report. The four major areas of focus to be addressed that were acknowledged by the local community, are the people themselves, water management, safe access, and agricultural sustainability. The issues and solutions highlighted by this study could be looked at in application to not only this site's future as the Letan Bossier Agricultural Trail, but to other budding agritourism projects around the Caribbean with similar issues of economic disparity, deforestation and need for ecological preservation through best management practices.

### **1.1.2 Ethnography Applied – Landscape Design of Lakou New York, Jacmel**

To the east of this journey up to Letan Bossier is Cayes-Jacmel, where the majority of tourist lodging lines the beachside, and to the west is the historic arts capital of Jacmel, sometimes spelled Jakmèl in Haitian Kreyòl. It is a vibrant and bustling bayside town, nestled into the lowlands of its mountainous surroundings. The major gathering space and pride of this community is along Lakou New York Boardwalk (see Figure 1 below).



Figure 1. 'Lakou New York' in Jacmel, Haiti, designed by Kristen Lonon, October 2010.

As one who has always valued field research and qualitative research informing the quantitative, critical ethnography adds a layer of long-lasting connection and intimacy to the community, where I can try to

make a positive difference and this should be more prevalent in every design process. This intimate relationship with the Jacmel community began during my first visit to Jacmel in October 2010, following the January 12<sup>th</sup> Earthquake, where discussions with users of the space, economic contributors of the space, government entities, and local advocates led to my design proposal of the Lakou New York Boardwalk along Jacmel Bay. The Haitian Government chose this design to be built because it was obviously informed by knowledge of the people themselves, as well as the physical space.

Culturally and aesthetically relevant application of simple design solutions like lighting, seating, garbage disposal, plantings, and paving informed the completion of project construction, which was one of the first designs implemented in the Jacmel Master Plan. Many design elements were added, others excluded, suggested materials changed, and the French name meaning Beach of the Ancestors, “Plage des Ancêtres”, was changed to “Congo Plaj”, and then officially called “Lakou New York” by locals, as they value the lighting system that allows them to enjoy themselves in the evenings as well as work late making and selling goods. Although I was not there to see the construction process, the fact that critical ethnography was the tool used to contribute to a life-changing design is enough incentive for me to continue this work, in not only Haiti, but in any space or community that I work in. According to the Nominated General Secretary of Haiti, Pierre M. Frantz Louis, who in 2010 was serving as Aid to the Mayor for Post- Earthquake Volunteer and Planning Organization, informed that my applied observation for design in this space was chosen not only for tourists but for locals, which was my original goal, met through serious government involvement and practical application.

Frantz informed, “We don’t have any industries here. We have the state workers, tourism, and also agriculture, so we thought it would be a good idea to invest, for social purposes and also tourism purposes... This design has positively affected local tourism, international tourism, and also the local economy. There are people who come around there and they frequent the hotels, the restaurants, around and down there more often, which is an added value for the area, for the entire town, and for the department.” He stressed need for a continued relationship between Louisiana and Haiti, strengthened through design.



## **1.2 PRESENT / DESIGN THESIS**

### **1.2.1 Current Opportunity – Letan Bossier Agricultural Trail**

In order to reach the most basic level of spatial organization and aesthetic improvement, certain capital improvements are necessary on the part of the local and national governments in order to attract future investment. There will also be limited lodging available to give tourists the opportunity to live in the area surrounding the Grand Basin of Letan Bossier, and learn about the ecological processes that keep Haitian agriculture afloat. As it stands there has not been a presentation to the federal government of design priority, leaving opportunity for improvements that could be implemented and advertised by the Southeast Department of Haiti and Jacmel's Ministry of Tourism Team, 'Experience Jacmel'. Currently, one picture is shown of the Grand Basin destination of Letan Bossier destination, which is, in fact, a peaceful mountain basin, but they fail to warn any visitor of the strenuous journey ahead of them if they plan to visit this place.

The conflict between advertisement of a space to the public, with lack of access due to the rockiest of roads with no guard rails or street lights, makes for a difficult time increasing economic stability for the area through tourism. The questions then presented in the designer's mind are 'How can we get locals and tourists to and from their destinations safely, while maintaining harmony, putting their needs first, before any tourist accommodation is made?' 'How can we get people to come to this space, and stay a while to enjoy without worry or fear of their surroundings?' 'How can we get the locals to take responsibility for, thrive within, and enjoy their own environment, while having a voice in how others could enjoy it as well?'

### **1.2.2 Thesis Question**

The research for design comes from the people, so it should first consider those people as socially responsible entities who have the ability to maintain the improvements they seek. Where possible, solutions in the areas of social responsibility, water management, access safety and reforestation will be applied, in that order of priority, as they were highlighted in interviews with local residents. These conversations led to targeted data collection by asking specific but open-ended questions. Of course, this was done after asking about historical and folkloric background as well as general life cycle rites and passages in the region. The

emphasis here is to allow the residents being interviewed to answer without being limited by pre-defined choices—something which clearly differentiates qualitative from quantitative or demographic approaches. Through community meetings and other communications, the research gathered will be applied as a series of sustainable design solutions to be reviewed and revised until the community is comfortable presenting this proposal to the local government for additional investment and action. The ethnographic field research process is one of intense communication, but most importantly focuses on a range of solutions for obvious issues uncovered through the field research process necessary to dig deeper into local issues. This report aims to outline these issues and solutions for the purpose of reaching necessary solutions to improve the experience in this space for locals and visitors alike, arriving at the thesis question, ‘How is Ethnographic Field Research Applied to Design in Letan Bossier, Haiti?’

### **1.3 FUTURE / SHARED VISION**

#### **1.3.1 Local Support of Research and Design**

In order to stay in line with the agricultural cannon, sensitivity to natural resources, as they currently exist, is imperative. There must also be addition of sustainable technologies, regulated by design guidelines, and enforced by the local stewards of the land. As referenced earlier from Frantz, a government official, sensible and necessary design solutions will be supported, as long as there’s community support and funding, which are both in place in the case of Letan Bossier. During a service project visit to Letan Bossier, where we helped to clone ornamental plants donated by LSU on the Mackandal Organik Farm, we were invited up to the Grand Basin, to see the relaxing space, one-mile north of the Farm, to discuss design needs and convince reluctant farmers of the coming project (see Figure 2 below). The organic growth of our team’s involvement speaks to the openness of the community to receive help.

Rural poor need economic drivers and will support projects that financially support the community. Poverty in Haiti is mostly rural at 75.2% compared to 40% in urban areas like the capital city of Port-Au-Prince (Haiti Partners). Community members express a readiness for increased tourism, along with an excitement about the economic gains to be expected, surpassing any desire to maintain the full freedoms they once had to

bathe and travel within this space, unrestricted. This is not to say that Bossier is willing to give up their land to inconsiderate development, but after community meetings in February of 2016, there isn't the same opposition to redevelopment and relocation of crops that the sugarcane farmers showed at our first planning meeting.



Figure 2. Conversation to convince sugarcane farmers of re-design need from May 2015 trip.

Justin Jean Toussaint, who worked for the United Nations with various agricultural projects in the mountains for almost twenty years, is the agricultural teacher and leader of this region. He explained to the farmers who were obviously angry about the plans for change, that their operation led by original land owner Sabeni Jean Batiste, would be interrupted by this new development of lodging and tourism. He had also informed the farmers that the landowner had willingly given up the cane field surrounding the basin to the government in order to complete this agritourism project. This plan has since been considered by the local community and agreed upon, in efforts to bring economic gain to their families who desperately need the support.

Toussaint is the operator of Mackandal Organik Farm, and was placed in charge of overseeing this agritourism project, as he's also a leading figure in the Komite Organization Explication Letan Bossier (KOELB), which is the community organization that's responsible for reviewing any plans for this site. KOELB, or the

Komite, is one of four community organizations in this area who work together on issues, big and small, to bring improvement to this area and its people. Based upon the local farmers' enthusiastic involvement with KOELB, and their excitement for continuation of ethnographic field research toward development of this project, it is safe to assume that unity and early communication in the design process has brought about structure and power in the community that can be used to more strongly present feasible design solutions.

### **1.3.2 Government Support for Implementation**

Only through trusted government sources who value integrity and transparency in the planning process, will the suggested design be implemented, as proposed or otherwise. It is evident that in Haiti, the government will only fund projects that will obviously bring in significant revenue, and since they've already shown interest in this project, it's imperative that the community shows a united front in voicing their concerns and organizing for design implementation that meets their local needs, above all others. Unification may come in the form of a formal presentation of this design thesis, to interested government parties, to show support and involvement in the process, surely resulting in understanding for problem solving. The Ministry of Tourism for the South-East region has already offered \$29,000 in support of this Agritourism project, and are actively working to recruit additional investment, as design needs are great in this community (see Figure 3 below). The major support system and supplemental funding source is the United Nations World Tourism Organization, or in Kreyòl, Organisation Mondial Tourisme (OMT). There was a set of plans that were supposed to be developed and implemented over the next few years, but because enough funding had not been in place, there is a pause on this project for an indefinite period, leaving time for strong suggestions and agreements between the community, government, and investors on what design elements and guidelines should be implemented to ensure local comfort and sustainability.

According to a friend of the Minister of Culture for Haiti, Jean-elie Gilles, this department is completely open to raising funds necessary to increase accessibility and functionality of sites. Through personal experiences with access up toward and down from the Grand Basin, and confirmation from the community that safety of access is a problem for both visitors and locals, the community of Letan Bossier can be confident that this

project is a good candidate to be backed by the Minister of Culture of Haiti, who's administration values and executes capital improvements for the specific purpose of providing access to national treasures, which Letan Bossier certainly is.

There are many reasons to be confident that the community's voices will be heard, at the very least, above less pressing aesthetic suggestions. Any ignorance of these needs would be detrimental to the spatial value of Letan Bossier to locals, in turn reducing the site's overall economic value to others, as visitors often come to witness the authenticity of local land uses to inform their own experiences in that space.



Figure 3. Agritourism Advertisement at Mackandal Farm. Image of locals carrying gathered crops along road.



## CHAPTER 2: CONTEXT

### 2.1 PHYSICAL LOCATION

#### 2.1.1 Active Location

The existing roads leading up to the Grand Basin of Letan Bossier will be those used to access the future Agricultural Trail (see Figure 4 below). The connection of these roads to the main highway of Route 41, which is the major thoroughfare of traffic between the Arts District of Jacmel to the West, and Cayes- Jacmel, the hub of tourist lodging, to the East. This will undoubtedly contribute to high tourist and local traffic, as well as demand to buy and sell goods at these connective nodes.



Figure 4. Letan Bossier connections to main highway of Route 41 shown in beige.

#### 2.1.1 Access to Site

Vehicular and pedestrian access is shared along the journey up the access ridge to the Grand Basin, with no specified partition in the road for safe pedestrian access, as large trucks commonly climb the steep roadway, taking up the entire road which varies from as narrow as 9 ft. in some places to 22 ft. in others (see Figure 5 below). The roadways are generally unpaved in rural regions, and are worn over time from foot traffic, motorcycles, and cars often pulling over to the side of the road to let another pass along the narrow passageway. There is strong communication between drivers in Haiti, despite a lack in

traffic controls. Commuters are accustomed to congested urban roads or steep and rocky roads that are barely accessible in rural areas. Safety measures like road widening, pedestrian partitions, lighting, plantings, guardrails and safely placed seating need to be added in an effort to make the journey safer and more enjoyable for locals and visitors, day or night. One effort has been made to cut a 1,510 ft. long vehicular access path around the 169 ft. incline at mid-journey. The original access path shown below was only accessible by off road vehicles and pedestrians as it's the steepest portion of the journey at roughly a 21% slope, and the newly cut triangular road veers off to the right and meets the steep pedestrian path at the top of this incline, reducing the slope to 11.5% along this vehicular access way, making pedestrian access easier for visitors or disabled locals, and frequent vehicular access more feasible.

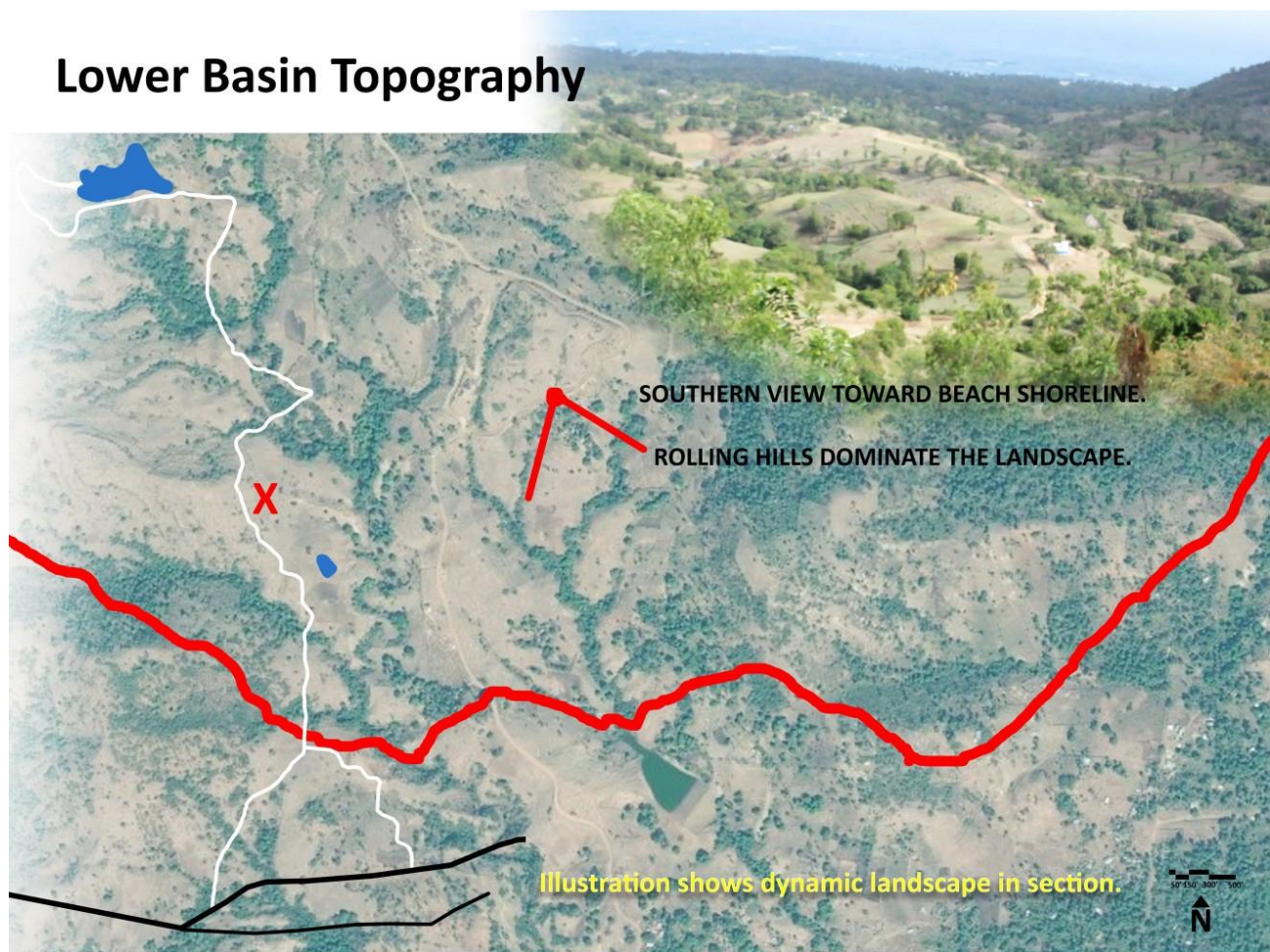


Figure 5. Main passageway to access Letan Bossier's northern Grand Basin is a dynamic journey along a ridge, risen between valleys and much higher ridges to the east and west, with the coastline to the southern view.



### 2.1.2 Flood and Drought

The beautiful environment surrounding Letan Bossier, the Haitian name for Lake of Bossier, is a prized sight after a 2 mile hike up a series of steep slopes from the main road. Because the mountainsides are steep, and heavily deforested in some areas, water is not slowed and drains to pool at the lowest points in the watershed, forming the Grand Basin, also called Letan Bossier. There is a secondary basin near the Mackandal Organik farm, which is man-made at the lowest point in this watershed (see Figure 6 below). This secondary basin will be referred to as the Lower Basin, where locals come to collect water to bring back to their homes to boil for sanitation for different uses like cooking, drinking, cleaning, planting, etc., as there is no running water in this rural mountainous region.

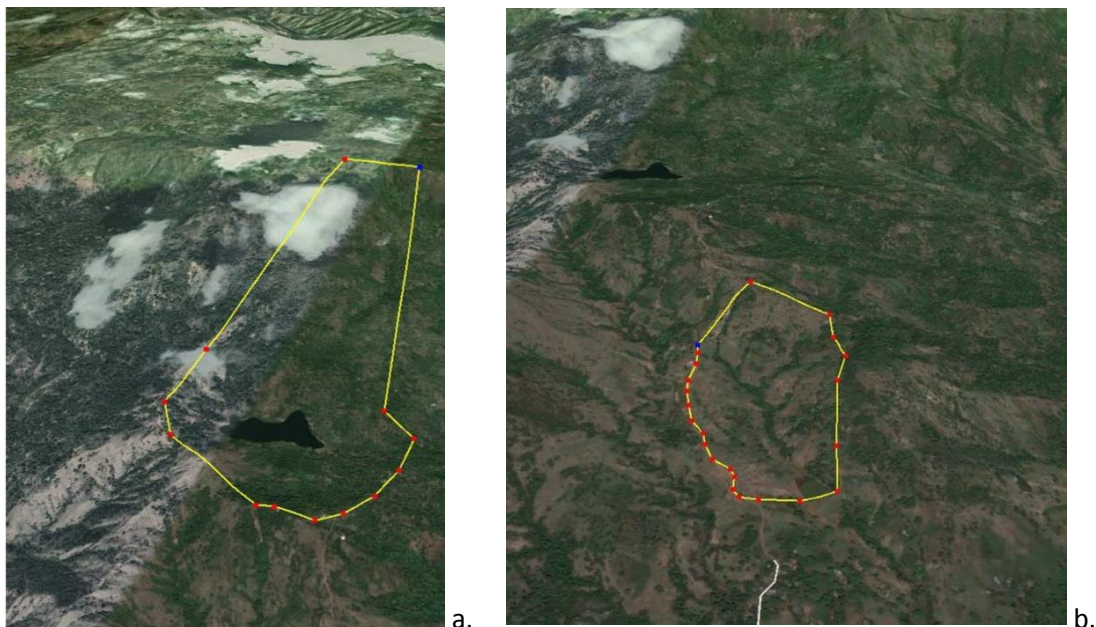


Figure 6. Watersheds of the naturally formed Upper Grand Basin (a) and the man-made Lower Basin (b).

Average annual rainfall is 54 inches a year, and in this heavily deforested rural area of Bossier, flash floods are a risk, but aren't necessarily a reported issue by locals, as there are only 80 homes within 1 mile of the Grand Basin, all located on high land. It was shared by locals in the community that they'd like to retain more storm water for local use in their Lower Basin, but also need a separate place to bathe and wash, as the Grand Basin should be reserved as a visitors' destination free of off-putting local activity that may contribute to lowering the water quality at the Grand Basin



### 2.1.3 Letan Bossier – An Existing ‘Agri-Culture’

Although agriculture is one of the few industries that remain in Haiti, it contributes to the vast majority of the rural economy (see Figure 7 below). Large swaths of agricultural operations exist further up in the mountains, but the lack of storm water retention in the heavily sloped highlands surrounding Letan Bossier leave it at a smaller local level, rarely growing enough crop to compete with large inland agricultural operations to sell at town markets.

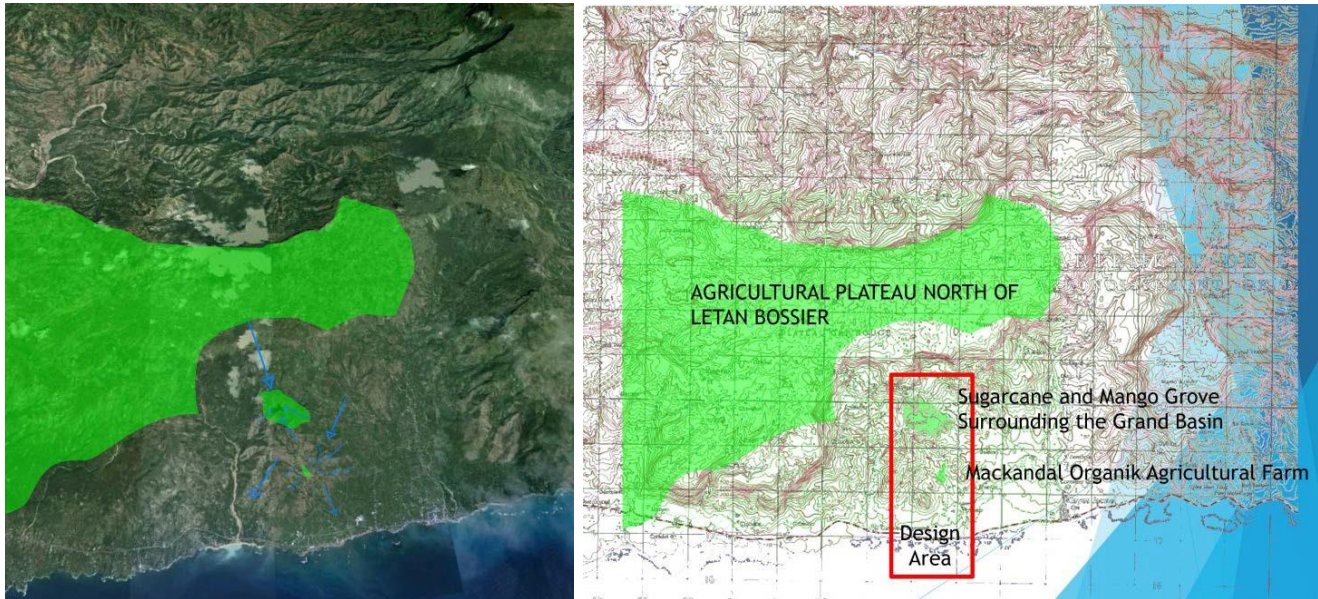


Figure 7. Existing agriculture surrounding the design area of Letan Bossier. 25' contours show slope (right).

Agriculture is picking up on a smaller scale residually, and also through larger projects where new agricultural technologies have been applied. Mackandal Organik Farm, one-mile south of the Grand Basin and only 1000 ft. north-west of the Lower Basin, has implemented technologies from the LSU Plant, Environmental, and Soil Sciences, who also gave seed of ornamental plant species to grow alongside the existing vegetables like, Moringa and Neem trees, which treat an endless list of health issues from inflammation to HIV/AIDS symptoms. The technologies implemented by Carl Motsenbocker's team from LSU included methods of grafting or cloning ornamental plants in order to include them in the aesthetic design surrounding the Grand Basin. The team also introduced "bucket watering" of medicinal crops, where the buckets collect rainwater and lead to perforated hoses that slowly leak to crops over time, saving water and labor time. Efforts like these must be preserved, invested in, and expanded as a matter of urgency to

continue addressing issues of malnutrition and methods of growing quality organic foods under strenuous geological conditions. As this site is imagined to be redeveloped as an agricultural trail and tourism hub, existing agriculture and natural resources like plants, animals and water need to be respected and preserved at the highest priority by the Ministry of Tourism of the South-East and its future investors. Furthermore, local residents like Justin Jean Toussaint at Mackandal Organik Farm are already acting as stewards of the land, and are knowledge bearers of technologies necessary to maintain agricultural operations in this area, given proper resources and funding. These stewards currently act on behalf of this land and should be protected as a part of the land, whether they are financial stakeholders in the land or not. Although property acquisition laws in Haiti are complex, what seems to be simple is the fact that this site will need varying methods of transportation, maintenance workers, tour guides, and administrators to run the newly redeveloped agritourism trail, and what better people to take ownership of the land and enforce regulation than the locals who already serve these purposes in some capacity. The compensation received from these tasks can potentially contribute to the long-term maintenance budget for the site. The design guidelines addressed later in this thesis are the first steps to sustaining the natural environment, so that it can continue to serve its current inhabitants and future visitors.

## **2.2 SENSE OF PLACE**

### **2.2.1 Social Identity of Letan Bossier**

Considerations must be made for differences in ideology, lifestyle, and mannerisms, between locals and visitors, especially in making programming and design, as locals' current use of space should be acknowledged and respected. The locals identify themselves as oral historians, farmers, fishermen, activists, and artists of the canvas, sculpture, clothing, jewelry, furniture, and other decorative pieces. Although the people of Letan Bossier are admitted artists, like their neighbors in Jacmel, creativity is difficult to translate into economic generators when there's a lack in consistency of materials, product availability and active locations to sell. The lack of artwork is a direct result of the lack in investment from visitors, but creating places to bridge that gap in financial exchange must be addressed.

Haiti is a young country, where 54.92% of the population is under 24 years old (CIA), not excluding rural areas, where children walk long distances to school and young men ride their motorbikes up and down the mountainside. The youth of this country is initially shocking, given the downtrodden image of the Haitian socio-economic condition, portrayed by media. Surprisingly, the young people of this area want the same things the elders of the community want, social responsibility, clean water for swimming and other practical uses, and safe access to the natural environment they've grown-up with (see Figure 8 below).



Figure 8. Community Meeting for Letan Bossier Redevelopment, February 2016.

The wish of the local community members interviewed was that the Grand Basin space and agricultural trail leading up to it, be an all-inclusive space where the local economy can flourish, but also where activities like bathing, clothes washing, and animal feeding and drinking are accommodated but relocated from the area surrounding the Grand Basin. Letan Bossier would then incorporate activities that serve the needs of the people, while avoiding detriment of visitors from relaxing comfortably in this space.

### **2.2.2 Communication at Letan Bossier**

In a close-knit community, especially that of rural locations, word of mouth and mutual respect are key in communication of need and implementation of action. There is an understanding between locals of right and wrong, and any adjustment to that knowledge is easily communicated with a conversation, or

series of conversations, to talk out discrepancies and reach solutions, giving added confidence that the changes made can and will be enforced by the local stewards of the land.

Storytelling is a major form of communication in parts of the world where literacy is less obtainable. In 2012, it was determined that about 85.1% of Haitians, ages 15-24, were illiterate (UNDP). The locals tell stories of fact and fiction to entertain and educate on life lessons, because it's understood that people don't always learn right from wrong in school or by reading words on a page, but by sharing perspective and understanding of the past and present.

The story of how the basin came to exist here in the community of Bossier is one of an eccentric nature, but not an unfamiliar story for people living near mountain basins all over the world (see Figure 9 below). Although the story is believed to be fictional, it still tells a loud tale of the morals, values, lifestyle, and history of the local people, who will be occupying, working, and maintaining this land. Their stories told, true or false, give as much of a picture of the people as any image could.

There used to be many homes in the low basin where Letan Bossier currently sits. One day, an old man who appeared to be homeless arrived to the town to ask for a drink of water from the people who lived there. He arrived at the first house and he was told that there was no water, so he was turned around. He arrived at the second house and the person gave him an old unclean container to drink from, so he turned around and left. When he arrived at the third house, the woman was very kind, and went to get her finest drinking gourd for him. The man was very grateful and asked her where her husband was. She said that he was up in the mountains, farming. The man strictly instructed her to go up there to be with her husband, and not to return home, and she should look down upon the town at a certain hour to see the power of what he could do. The woman did not understand, but followed the instructions to be with her husband in the mountains. As she looked down onto the town, she saw a great flood arrive from the mountains to flood the entire town, creating the existing Grand Basin.

Figure 9. "The Story of Letan Bossier", as told by a resident, Imale Roche Michelle.

The character in this story was in awe that she was saved by charity. This theme is echoed in the kind and hospitable nature of locals, and should be spread by word of mouth, literature, and on-site signage to inspire visitors to build relationships with locals and to both find comfort and a sense of introspectiveness within this environment.



## 2.3 LOCAL PRECEDENT STUDY: BASSIN-BLEU TRAIL

### 2.3.1 People as Guides

Bassin Bleu is a series of 3 basins, varying from the shallowest at 15 feet, to the highest at 75 feet. All along the trail of Bassin Bleu, there is nature in its raw form, with only a path cut through, and very few traces of what was once old structures, but the incentive to get people to and through this journey is the expectation of the experience itself, and the anticipation for the final destination, which is an outstanding and incomparable waterfall dropping into the deepest of the 3 basins, and surrounded by geological wonder, with steep and slippery moss covered rocks (see Figure 10 below).



Figure 10. Swimming hole with waterfall at end of Bassin-Bleu journey (left). View Southeast toward Lakou New York along Jacmel Beach from farming plateaus above the waterfalls and walkable trails of Bassin-Bleu (right).

Jacmel is 7.5 miles away from Letan Bossier, but only 4 miles away from Bassin Bleu, making this precedent a more competitive tourist destination, built around similar ideas of water quality, rural life, and agriculture (see Figure 11 below). Although 11 miles away from our site, Bassin-Bleu can serve as not only a comparable precedent for this design thesis, but is already known to locals of Bossier as a pristine tourist destination to look toward to for goal-setting in the programming and preservation plan for their space.

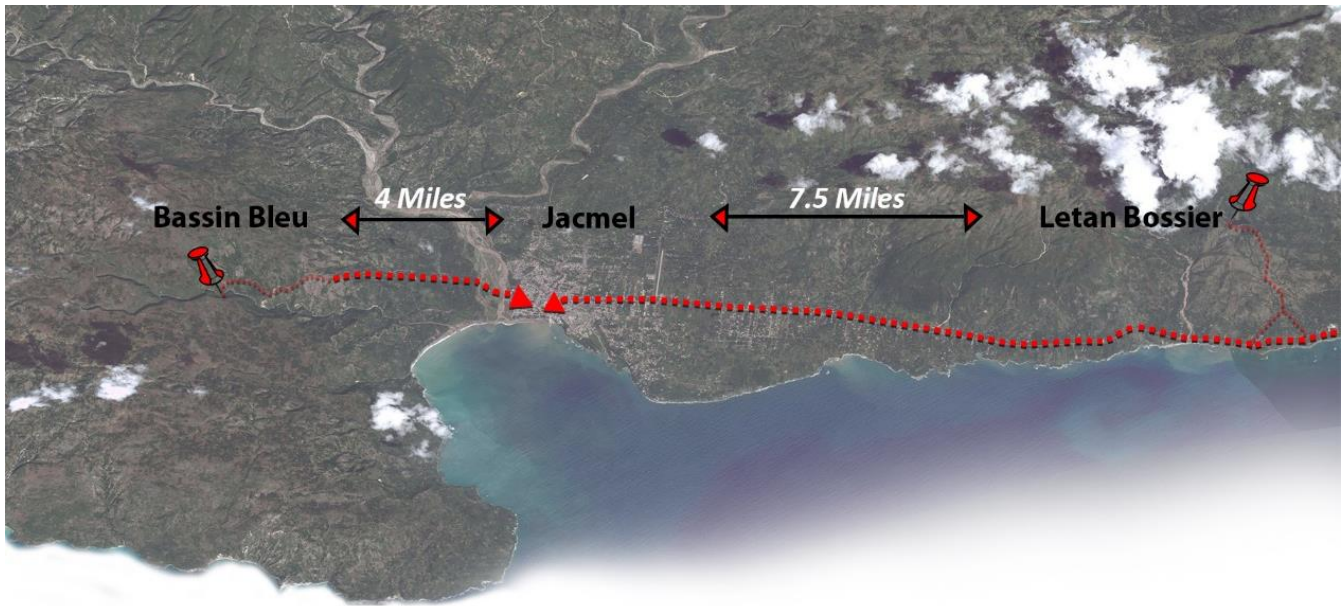


Figure 11. Bassin-Bleu compared to Letan Bossier in proximity to Jacmel via vehicular road and pedestrian trail.

Without a doubt, the most important feature of the Basin Bleu experience is connecting with tour guides who serve as representatives of that site, knowing the challenges of the journey as well as moments of ecological and architectural history to highlight along the way. This person's sole job is to give the visitor a sense of security and understanding, which they would not have traveling the journey alone. Not only do the guides serve as a navigator, but without their help, visitors cannot access the most important feature of the space, which is the third and final waterfall that can only be accessed by climbing down a cliff by a rope, provided by the guides themselves (see Figure 12 below). Actual restriction of access to spaces without the help of a guide virtually eliminates the possibility of injury along the steep slopes and waterbodies, and also guarantees additional economic compensation paid directly to locals, outside of the fee already paid to enter the space, contributing to the maintenance of both the guide's livelihood and the preservation of the tourism program.



Figure 12. Tour guide leads visitor down cliff edge, with a rope secured by the tour guides themselves.

### **2.3.2 Water Quality Protection Measures**

The locals of Bossier understand that in order to achieve an experience like Bassin-Bleu's clean flowing water at Letan Bossier, it will take sacrifice of unregulated use of this water in order to bring economic growth. Despite some challenges, the guarantee of clear water and guided retreat can be achieved at Letan Bossier through mutual respect of authority and implemented practices, that although weren't in place before, will be followed based upon an understanding of the social-fabric of this community. Restrictions on littering, defecation, and use of water for any reason other than swimming in the 3 basins of Bassin Bleu help to guarantee a clean water standard to be followed by locals and visitors alike.

### **2.3.3 Access Safety Measures**

The pathways to Bassin-Bleu are pedestrian only, as vehicular roadway access ends at the visitor center. The long journey by foot is guided by locals holding your hand and carrying bags to make the journey much easier on one who's not familiar with navigating the unpaved landscape. The online advertisement for this space gives proper warning of the journey so that the visitor is fully prepared for the difficult walk, well worth the struggle toward the destination of the secluded waterfall and swimming basin enjoyed with locals.

This site is very different from what privileged visitors may be used to, and presence at such a place is incentive in itself to endure the conditions of the landscape on the way up the series of slopes, with loss of electricity, internet connection and phone service. With only local guides as support, one can focus on the journey ahead of them and the environment around them, without fear of safety or missing valuable information.

#### **2.3.4 Vegetation Identification**

The Bassin-Bleu journey is lined with edible and ornamental planting materials, including cocoa, that are highlighted with vegetative signage to for identification. These plants are pointed out and pieces of it are broken off by guides to give to the visitor to see, touch and taste the new landscape they've come to enjoy. Bassin-Bleu already seen by the locals of Bossier, and the region for that matter, is perceived as a prize to be shared with the world, with the potential to inspire other highlights of natural beauty in the South-East Region, including Letan Bossier.



## 2.4 INTERNATIONAL PRECEDENT STUDY

### 2.4.1 Pangong Tso Lake, India-China: People as Economic Generators

Pangong Tso is a saltwater lake deep within the Himalayan mountain range at an altitude of 4,350 meters above sea level (see Figure 13). The low air pressure makes for clearer and more intense colors to show in the landscape. The lake is only reached by pedestrian pathways led by tour guides that require a visitation permit before escorting the group to your desired destination. This restriction controls and accounts for the flow of visitors, guaranteeing economic contribution from all guests, and also the individual experience of the visitor through guided tours.



Figure 13. Pangong Tso Lake, India-China. Photo credit: Flickr.

#### **2.4.2 Moraine Lake, Banff National Park, Alberta, Canada: Water Quality Attraction**

Moraine Lake is located within the Canadian Rocky Mountain Range and is one of the most heavily photographed landscapes in Banff National Park (see Figure 14 below). It is known as the 'Jewel of the Rockies' because of its deep crystalline waters that perfectly mirror the surrounding pine forest, mountains, and sky. Because of this lake's impeccable water quality, people are willing to pay the park pass of US\$9.80 to enter and enjoy this space for a short period of time.



Figure 14. Moraine Lake, Banff National Park, Alberta, Canada. Photo credit: istockphoto.

### 2.4.3 Jiuzhaigou National Park, Sichuan Province, China: Access Methods

Jiuzhaigou National Park is a popular Chinese tourist destination (see Figure 15 below). It is centered on a tranquil ecological experience surrounding a natural water body formed where three valleys meet. The difficult to navigate landscape does not put off visitors, as tour busses are stationed to get visitors from point to point in the Park to see forests and waterfalls that meet to create this environment. Vehicles are not allowed too close to water bodies, helping to maintain clear water and limit vehicle runoff.



Figure 15. Jiuzhaigou National Park, Sichuan Province, China. Photo credit: istockphoto.



#### 2.4.4 Three Rivers Eco Lodge, Dominica: Caribbean Agricultural Tourism

Three Rivers Eco Lodge is a solid example of an agricultural tourism operation (see Figure 16 below). In the beginning of the development process, issues were identified that directly affected preservation of rural history and methodology, using these structures and stories to influence the new program for agricultural attraction, prior to consideration of the coming tourism increase. Here, three rivers meet on 9.5 acres of land in South Dominica, creating a lush ecological environment for the cottages that surround the area. The banana farm that existed here before was destroyed by excessive use of chemicals, serving the space as a warning to locals and visitors alike of the need to maintain a minimally invasive environment. The current program includes community activities with locals to learn from and participate in customary song, dance and entertainment, as well as learn agricultural practices directly from locals. Three major goals in mind when this space was opened to agritourism were eco-conservation efforts that attract visitors who are specifically interested in land conservation, tourist accommodations that are cohesive with the natural environment, using natural building materials, and 'edutainment' to allow visitors and locals to connect on issues of organic farming and sustainable living, on an informal, but equally valuable level.



Figure 16. Three Rivers Eco Lodge, Dominica. Source Reference: (Harvey)

## **CHAPTER 3: DESIGN APPLICATION OF QUALITATIVE RESEARCH**

### **3.1 PHASE 1: PEOPLE – STEWARDSHIP MAINTENANCE PROGRAM**

Foreword: Critical Ethnography teaches us that people make a place, and groups within that place should be highlighted as culture bearers and storytellers of that space. The locals are the living history linking visitors with new surroundings. The value of the land is with its people as protectors of the environment, and these people should be put in a position of authority to sustain growth and development.

#### **3.1.1 Issues Identified**

Issues outlined are to be addressed, dealing with need for site regulation through community stewards.

- Lack of appointed responsibility for entire site, as opposed to individual property maintenance.
- Lack of market to buy and sell goods.
- No on site transportation assistance for economic generation.
- No charge for site access to contribute to site maintenance.
- No food or drink industry associated with on-site agriculture.
- No fishing, swimming, or water use regulations.
- No addressed properties.
- No obvious way-finding or identification signage.
- No visitation regulation for limited capacity site.
- Lack of consideration for chemical washing products, and bathing in water at Grand Basin.

#### **3.1.2 Solutions Applied**

-Implement tax incentives for local stewards to enforce water quality standards within proposed jurisdiction outline around the 3 watersheds of Grand Basin to the North, the southeast Lower Basin, and West of the roadway beside Mackandal Farm (see Figure 17 below).

- KOELB to appoint local stewards within proposed jurisdiction to aid visitor access to Grand Basin by donkey, ATV, and motorcycle, while others are assigned as pedestrian tour guides.

-Stewards appointed to traffic control gates at journey entry near Route 41 and at visitor center, to restrict vehicular access to the Grand Basin to only service workers and residents. Only registered vehicles of guests to enter roadway to be parked at visitor center, 1 mile from Grand Basin waters.

-Appoint stewards to maintenance duty to take care of cleaning catchment grates, planting beds, water bodies, and garbage disposal, to reduce risk of backed up waste on-site.

-Appoint stewards to enforce catch and release mandate for all licensed guests of Letan Bossier, who's training by locals is included in paid licensure process. Only allow limited local fishing for food.

-Application of way-finding, safety and plant identification signage in both English and Kreyòl as opposed to French.

-Incorporate storytelling and folklore into educational script of stewardship tour guide program.

-0% Displacement of homesteads alongside Agricultural trail and entry space. All design solutions made in unsettled land, and any displacement of property has to be negotiated between that resident, the KOELB, and government representative for appropriate financial compensation and all relocation efforts funded by that government entity.

## Stewardship Jurisdiction 1<sup>st</sup> Step Toward Sustainability



Figure 17. Journey experience at Bassin-Bleu led by local guides to educate and keep tourists safe (left). Proposed Bossier Stewardship Jurisdiction based upon upper, lower, and western watersheds (right). Within this proposed jurisdiction, proposed spaces for water collection along steep slope are outlined in black.



## 3.2 PHASE 2: WATER – STORMWATER MANAGEMENT AND SUSTAINABLE TECHNOLOGIES

Foreword: Water is the most vital resource on earth, and is a pressing issue in the mountainous region of Haiti. This rural community has taken steps to increase water collection for local use, but lack in regulations leave locals and visitors at health risks, and may continue to deter visitors if not repaired.

### 3.2.1 Issues Identified

Issues outlined are to be addressed, dealing with need for waterway regulation and enforcement.

- No garbage disposal units, recycling bins, or pickup.
- No storm water runoff regulation or filtration.
- No vehicular access restriction near water bodies.
- Use of Grand Basin bathing and washing (see Figure 18 below).
- Animals Drinking from the Grand Basin.



Figure 18. Washing, Bathing, and Animal Drinking at the Grand Basin.

### 3.2.2 Solutions Applied

Stormwater Management - The goal of the design applications is to provide safe access along roadway while incorporating practical storm water catchment systems to help solve the issue of water collection for local use. It was expressed that the local people want a separate place for bathing and clothes washing, away from the main attraction of the Grand Basin. Due to steep slopes throughout the watershed, water catchment and retention are an issue that could be solved through the provision of adding a storm water management system, utilizing the natural grade of the land to help new design elements act as filtration systems to contribute to cleaner and more controlled runoff. Overflow of runoff will be directed through an out pipe positioned toward the existing tributaries that lead to the depleting water source of the Lower Basin, in turn helping to concentrate storm water collection for local need and recycle said water through a cleaner, thoughtful system, aiming to only borrow, not deplete the existing runoff supplied to the lower watershed and man-made basin.

Grand Basin Regulation - The water level at the Grand Basin varies from 9 feet at the shallowest, to 25 feet at the deepest, exposing the grassed basin edge for potential use in many ways. This vast variation shows that the evaporation and groundwater recharge rate is high, although not specifically known, must be addressed. Cleanliness and sustainability of these waterbodies, or any others to be added to this space, is dependent upon a sufficient amount of water to sustain plant and animal life. Storm water retention and filtration will further free this space for functional use, while enforcement of design guidelines and programming standards will maintain the pristine, unharvested, aesthetic features that the local community wants to see, celebrating its existing beauty and attracting visitors to enjoy the space without reservation, as the locals will (see Figure 19 below). The request of lodging structures surrounding the Grand Basin leaves the necessity of a composting toilet requirement for each individual structure, regularly maintained by appointed stewards, to minimize pollution of main water attraction from defecation (see Figure 20 below).



# Grand Basin Preservation and Restoration

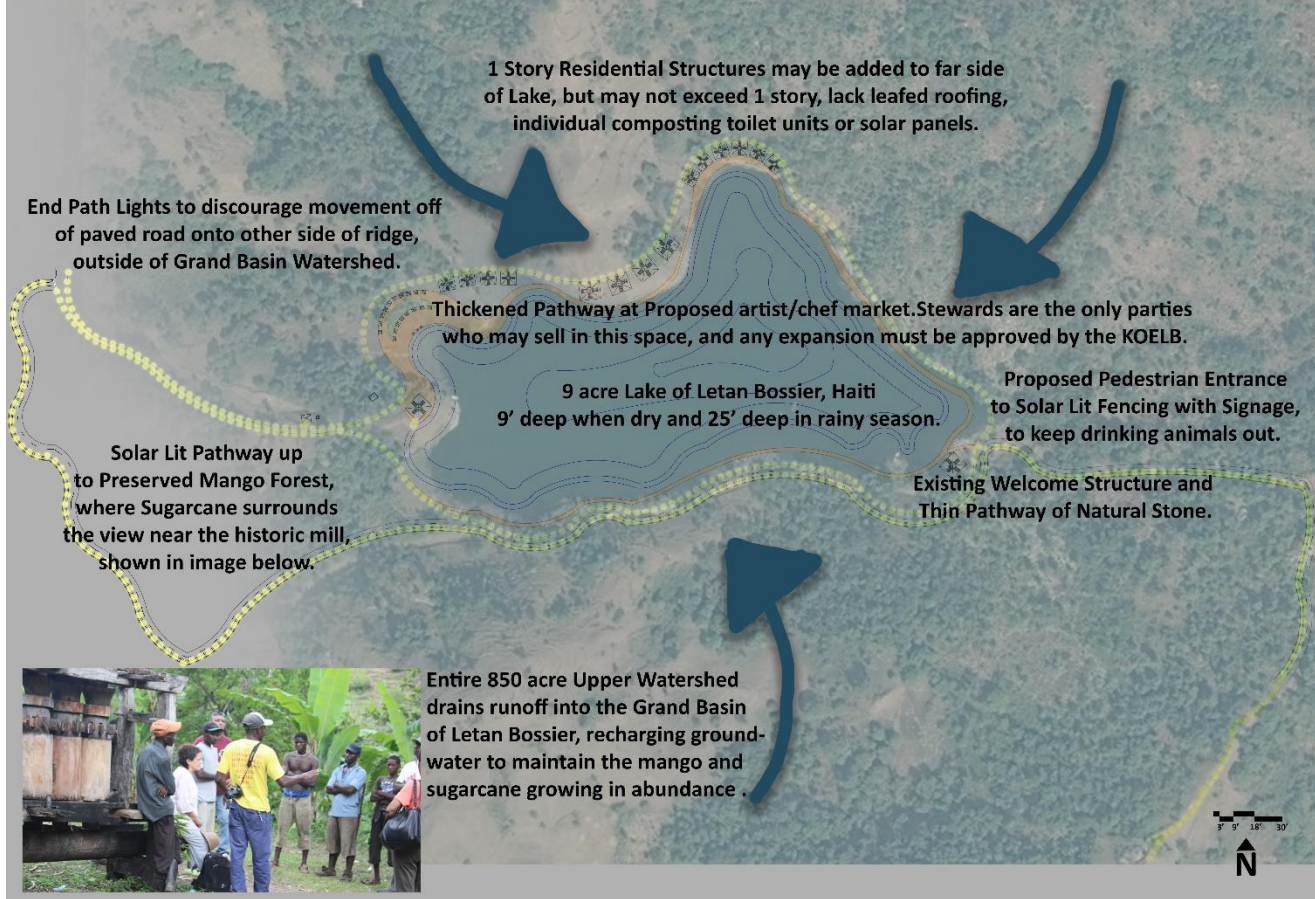


Figure 19. Grand Basin connection to lit pedestrian pathway in closed loop around the fenced basin edge. All vegetation within the upper watershed should be preserved and the historical sugarcane mill as a part of the agricultural education visitors will receive from the appointed stewards. Deforestation is not as severe here where stormwater runoff completely surrounds the basin, bringing nutrients to existing mango and sugarcane grove. Composting toilets required for all structures, as basin-side housing for tourists and locals cannot put the cleanliness of the water at risk. A second line of defense from filtration from the proposed Grand Basin Market is physical filtration through garbage disposal, plantings at basin floor and UV water fountains to add oxygen to the water and break down toxins. Although we can treat the problem, it's best not to allow any development to put the community and the reputation of the space at risk.



Figure 20. Dry composting toilet mandate for all housing and office structures surrounding the Grand Basin. Although thatched roofing preferred to blend structures in with the environment and show cultural integrity, a solid variegated roof base with gutters leading to an individual cistern needed, as not to deplete Grand Basin's water supply on building function (left). Waterless and odorless system separates urine from fecal matter, and stores them in separate tanks for settling and later use. 2" of sponge material above grate placed at bottom of upper fecal tank, to allow any excess liquid to drain, reducing high nitrogen content which may prolong decomposition process. System takes advantage of existing grade toward Grand Basin, as 30% slope needed to help turn human manure into compost (right). Each use of waterless compost toilet must follow with scoop of  $\frac{1}{4}$  part ash and  $\frac{3}{4}$  part dirt mixture placed beside toilet at all times, as this will help to decompose new manure. All toilet paper to be disposed of in separate trashcan to be emptied 6 times a day. Proposed preservation of existing sugarcane, mango, and other vegetation within protected watershed to be maintained by appointed stewards who are also responsible for compost unit function, emptying, and agricultural application of liquid and solid fertilizer to surrounding plants. Liquid waste to be safely used in field after 3 weeks settling, to be mixed with 10 parts water. Preventing defecation in and pollution of the Grand Basin requires strong concrete base with layer of plaster. Croton species being cloned by Mackandal Farm proposed to line pedestrian paths.

Stormwater Catchment System - The lower basin's watershed is a total of 52 acres of land sloping down with the roadway as its west barrier and the steepest slope along this journey to its north. As there is currently no water body outside of the Grand and Lower Basins to bathe and wash clothes, the runoff from the 6.5 acre area of this slope, between the original pedestrian walkway and newly constructed road, will be borrowed from the total watershed and redirected to a newly constructed Washing Station, in an effort to provide a separate



space for a needed local land use (see Figure 21 below). As groundwater recharge is necessary to maintain the natural ecosystem, the goal is not to deplete watershed runoff, but rather, catch only a portion of the water for community use and re-introduce the overflow of runoff back into the natural tributary system leading to the Lower Basin.

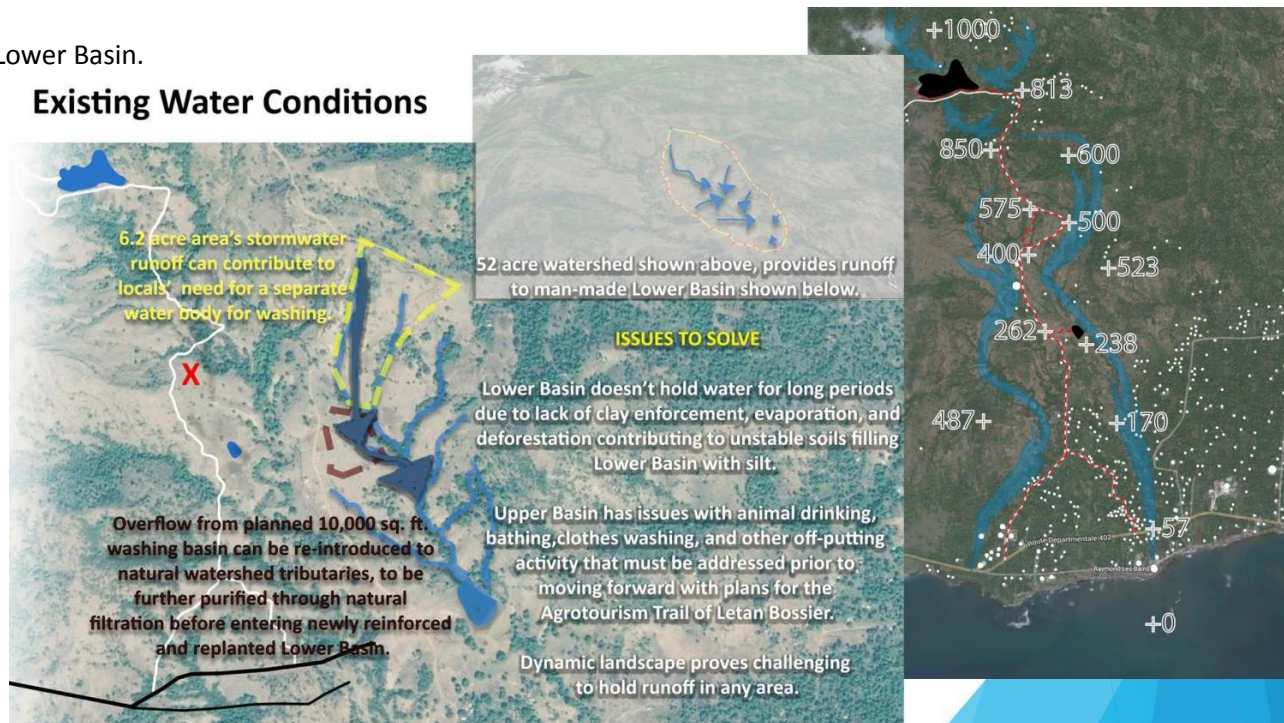


Figure 21. Lower watershed drains toward lower basin tributaries (top). Proposed water catchment for alternative use (left). Spot elevations and structure density from beachfront to Grand Basin (right).

Groundwater will continue to permeate the natural landscape surrounding the catchment system, and the excess surface runoff flowing from the northernmost point of the lower watershed, down to the foot of the natural arroyo will be captured along the roadway's edge. The catchment system will run all along the inside edge of the newly widened, paved, and planted 1,510' roadway, sloped inward at 1% toward the newly planted and stabilized inside wall of the cliff that this road runs along. Plantings and a stabilized gravel pathway will serve to filter waste material, allowing cleaner water to flow toward the washing station, and will also lessen silt erosion from the loose dry soils at the edges of this 21% slope. The roadway north and south of this planted slope will not be sloped in one direction at 1%, but in both directions at 1% so that the crowned roadway drains to shallow 1 ft. deep planted ditches at the road's left and right edge, serving as a buffer between road and property. The shallow ditches will meet a 3' wide planted ditch separating the main pedestrian passageway from the high speed traffic of the main highway, providing a complete circulation system for water and pedestrians.

Grand, Lower and Washing Station Basin Water Retention – Choosing building materials that already exist on site is ideal because the community needs a way to reduce groundwater infiltration and pollution. A way to accomplish this is by using ‘cut/fill’ procedures to improve hydrological and community circulation by leveling and widening roadways for a smoother journey, while using the crushed rock and stone from unstable roadways to be leveled and widened at ridge edges along the journey. This 2’ rock layer will be placed above a 2ft. layer of clay as the first layer of infiltration defense, and water tolerant plants will be added to the floors of the Grand, Lower, and Washing Station Basin floors along with rock reinforcement, in an effort to increase oxygen in water to breakdown toxic chemicals and maintain fishing stock. Catch and release mandate for visitors and fishing license required for all fishermen. Plantings at water and land edges will also serve as land stabilizers and silt filtration systems to prevent water displacement from the Grand and Lower Basins, allowing for the water level to stay higher for a longer period of the year (see Figure 24 below).

Physical Filtration – Garbage disposal units for both recycling and waste, at 200 gallon or more capacity in specified locations, along with appropriate pickup system maintained by appointed stewards, and this will be a more possible reality if the roads have been leveled for efficient access. Lack of trashcans at the precedent of the Bassin-Bleu attraction allows for tourists to dispose of plastic bottles in natural landscape, which often find themselves to the larger water bodies, diminishing the perception of clean water flow. Grated gully and pipe system will serve as ‘grate walls’ with piped opening at lowest contours, flowing toward entry and exit pipes to slow and filter debris from grey water. In a heavily deforested mountain area such as Bossier, where any thriving vegetation is prized due to over-drainage of storm water runoff, physical filtration through natural straining processes is a preferred method of purification, as opposed to chemical processes that have the potential to negatively affect the surrounding vegetation through polluted runoff.

Pollutant Filtration - Ultra Violet light within fountain system attached to biological filter to preserve and protect fish, as well as remove floating debris from water surfaces. UV light will aid in removing dangerous chemicals from water, fountain movement will oxygenize the water, allowing for more consistent natural breakdown of pollutants within the water.

Shower System – Water to be pulled from the proposed washing station basin, through filtered pipe to shower stalls (see Figure 22 below). Variegated tin roofing at shower stalls surrounding Washing Station, angled to direct runoff towards front of stalls where Citronella bushes can repel insects and can contribute to a more sensory experience through vision and smell before and after showering in the individual stalls. Grey water from shower stalls will drip through .5' deep permeable gravel and stone flooring to pass through 20" sand filtration layer, and finally passing through a 20" charcoal bamboo layer used to absorb impurities from the water, before reintroducing the clean runoff to the Washing Station Main Basin. Water in the washing station will be pumped through a constant water flow system, guiding the water through vegetation and rock formations to aid in physical filtration in the sediment fore bay, before re-entering the washing station retention pond (see Figure 23 below).

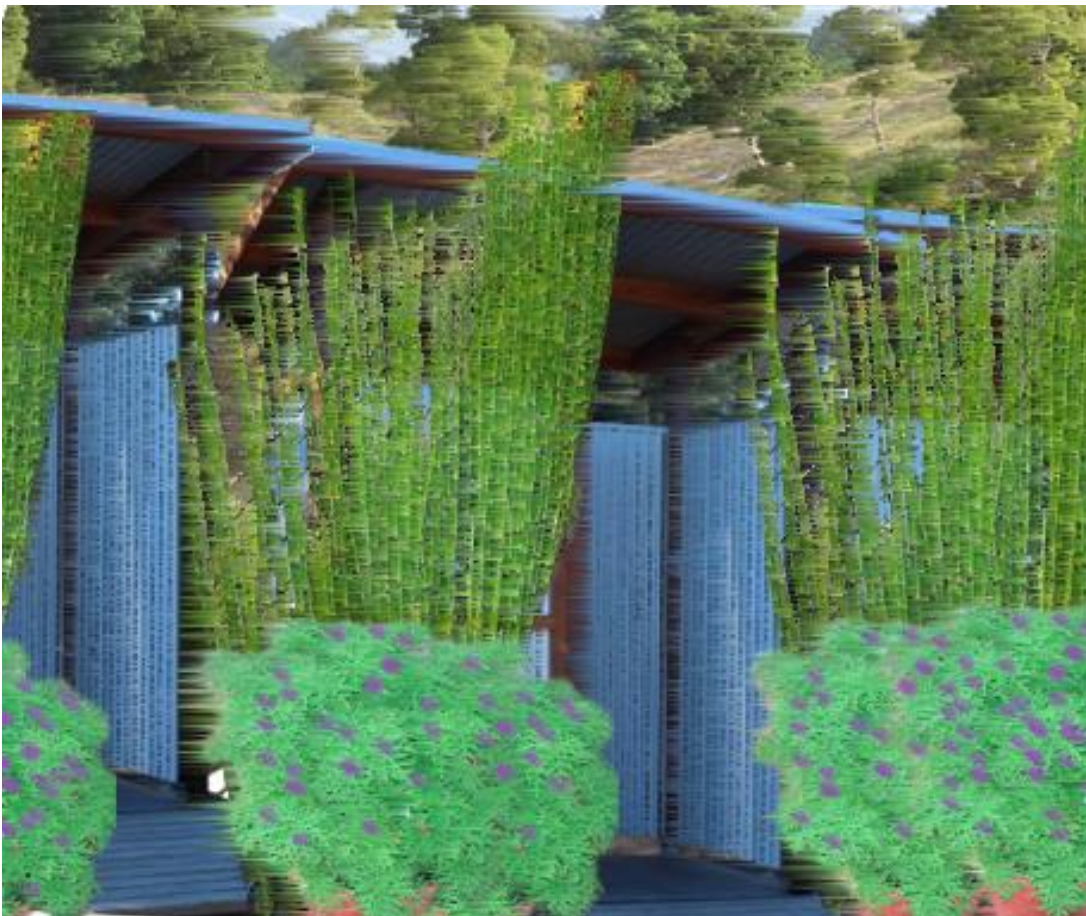


Figure 22. Concept image of solar powered shower stalls along washing basin. Used water seeps through the slightly raised floor boards toward purification through gravel, sand, and charcoal bamboo before groundwater recharge. Relaxing smell of citronella, or mosquito plant, repels insects, treats skin and mental health. Planted with horsetail, species to be experimented with and maintained in addition to roof runoff watering.



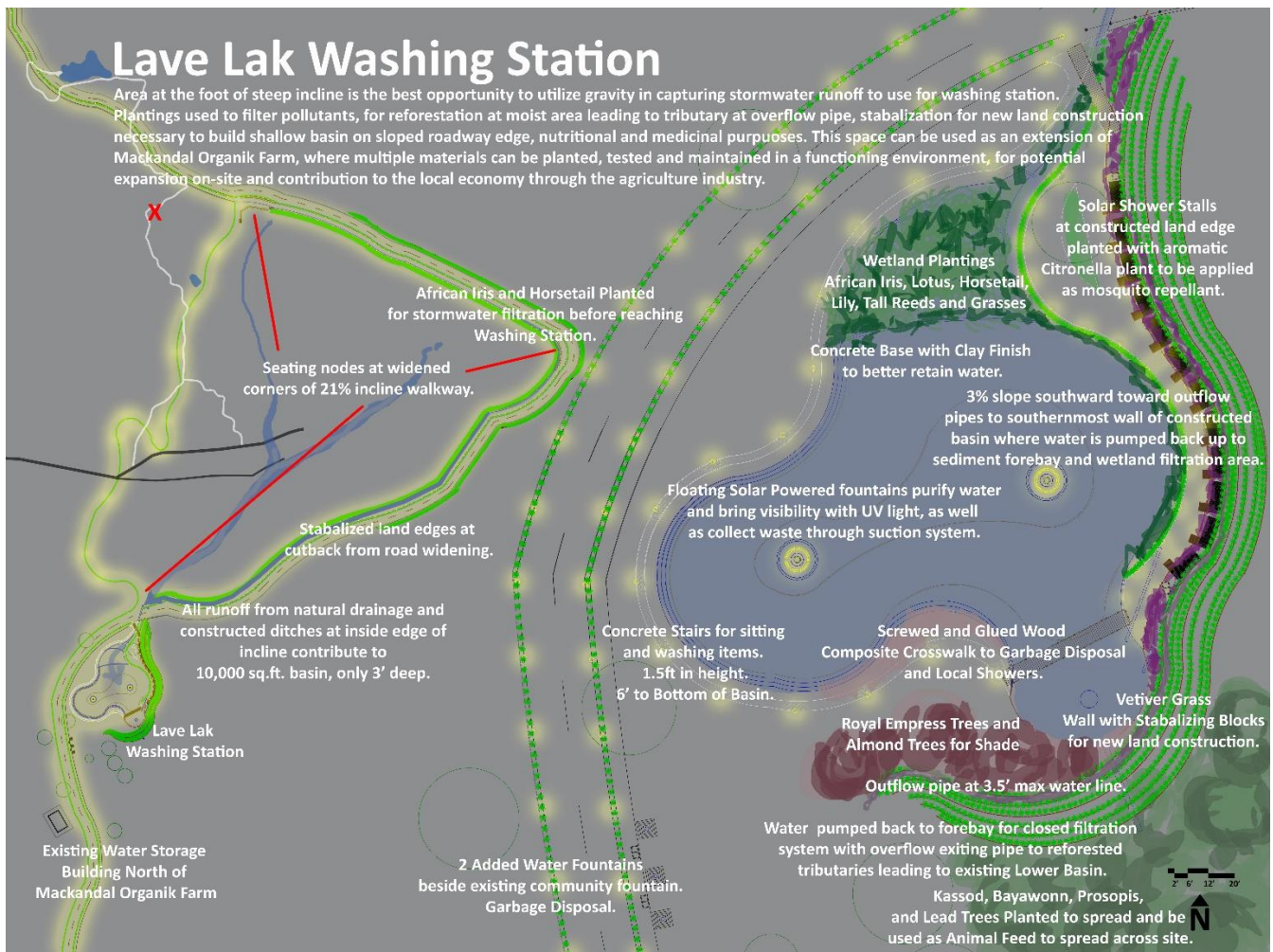


Figure 23. Proposal to widen roadway, add seating areas at widened elbows, and plantings at catchment basins and along pedestrian walkways species access for safety, shade, nutritional and educational purposes. Water from natural arroyo on slope and from constructed roadway catchment are channeled into washing basin with fortified bottom edge to retain water for use and reuse through filtration via planting experimentation with filtration plants outlined later in this document, along with other materials approved for local benefit by Justin Toussaint of Mackandal Farm. Pumping through closed system allows for clean shower water for stalls lining the rear walkway of the newly constructed washing station. All overflow at 4' level from basin bottom will be overflowed into the existing arroyo leading to the lower basin, which also will have a fortified edge and plantings for land stabilization, aeration, and filtration.

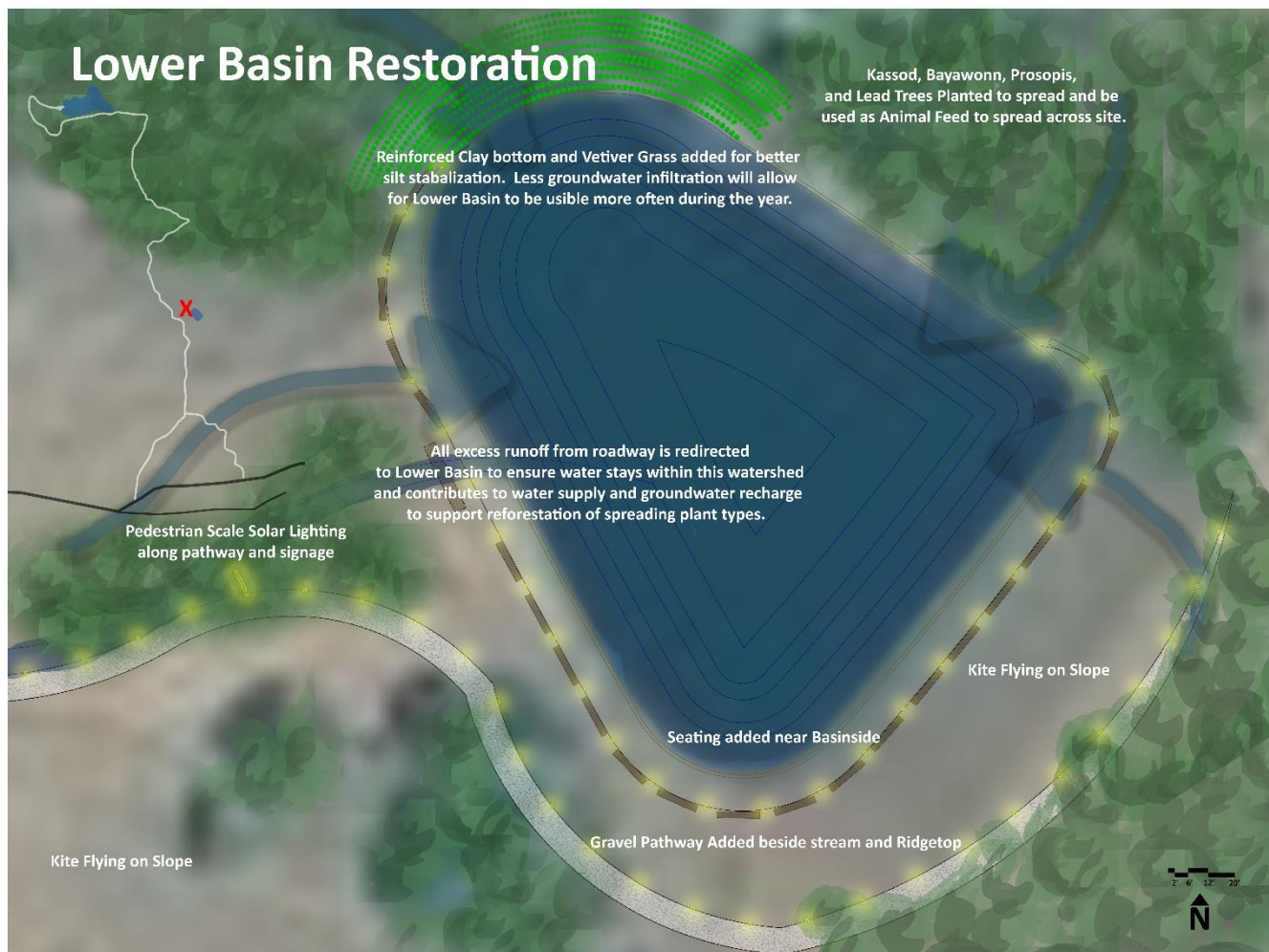


Figure 24. Lower Basin planted with fast spreading species acclimated to this sites conditions. Plants will spread based on groundwater and help to reforest this area along the natural slope, providing refuge for water collection, relaxation, or recreation at events like the annual kite flying event held on the surrounding slope.

### 3.3 PHASE 3: ACCESS – ROADWAY AESTHETICS AND PATHWAY SAFETY MEASURES

Foreword: Measures have been taken on site to make access easier from the main Highway of Rouge 41, up to the Grand Basin of Letan Bossier, like cutting roadways into steep slopes, and steps to add incomplete pathways around the Grand Basin, but safety measures all along the journey need to be taken to make this site accessible, functional, and sustainable for locals and visitors alike.

#### 3.3.1 Issues Identified

Issues outlined are to be addressed, dealing with need for organized circulation, as not to deter visitors.

- No local branding or signage.
- No parking or vehicular restrictions.



-The existing roads vary in width from 8-25 feet in some areas, based on traces left by traffic over years (see Figure 25 below). Based upon rising activity in this area, including larger service vehicles that were once not as common, road widening is the only choice to add organization and safety measures along easy access roadways for locals and visitors alike.



Figure 25. View up from and down toward Mackandal Farm (left). Traces of pedestrian access across site, red, and elbow of 11.5% slope sharp and dangerous, circled in yellow.

### 3.3.2 Solutions Applied

- 6' minimum pedestrian walkways with 17' minimum roadway width to allow for 2-way access needed.
- Specified locations for welcome signs, picture points, planting materials, and history pieces.
- Caution signs and guard rails to be added or restored at crosswalks and dangerous steep nodes.
- Pave road with 1% slope toward grated gutter at lower side, which is the inside edge of the roadway

(see Figure 26 below).



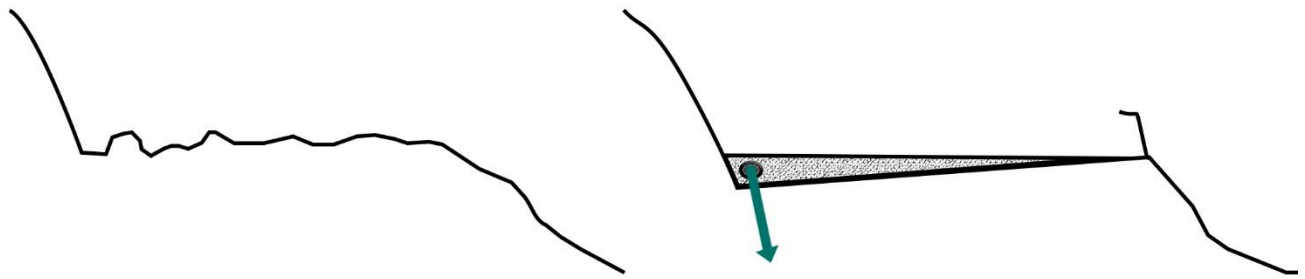


Figure 26. Roadway cut/fill concept for stormwater treatment through crushed gravel before entering drainage ditches toward Washing Station. Cut boulders off roadway surface for reuse in Basin bottom reinforcement. Road flattened to a uniform 1% grade toward inside edge. Widened roadway to reflect 6' pedestrian pathway at inside edge of roadway along 11.5% slope.

- Seating provided at gathering nodes along journey.

- Low-level, frequently spaced solar lighting to line seating areas, pedestrian walkways and road edges, separating vehicular and pedestrian traffic. Size preference for 360 degree rounded individual lights is 6 inches in diameter, allowing for less wattage necessary to light the road edge of a 6' path, with one fixture every 18' and an illumination diameter of 9'. This is a cost effective way to provide a sustainable quick-fix to the issue of dark journeys up and down this steep roadway. The less bright lights will lower the chance of over glaring travelers' vision at night and will also serve as an example for future lighting changes, proving that elevated lighting fixtures may be unsightly and could potentially interrupt the beautiful view across the dynamic landscape (PPS).

As previously stated, green energy is invaluable in mountain regions like this one that depend on daylight only to finish the workday, with no alternate forms of electricity. Solar energy has the potential to break lifestyle barriers through technologies that locals would embrace if able. As in the example of Jacmel locals at Lakou New York Beach, the capital investment of adding lighting along a pedestrian walkway provided a new life for the economy of Jacmel, as people were able to craft, cook, sell, and socialize in a space that once darkened with the setting of the sun. Now, possibilities have been expanded for options in daily

activities like cultural gatherings, market activity, fitness, performance and overall socialization. This positive result of economic growth simply from providing light can be expected in Letan Bossier.

-All design solutions aim to display cultural integrity with natural leaf roofing for added market structures, using wooden materials for aesthetic consistency. Sturdy and sustainable construction to be guaranteed with glued and galvanized screwed wood composite, as opposed to nailing natural boards. Re-use of permeable and semi-permeable materials, like crushed gravel from existing rock and beach pebbles where appropriate, is the easiest way to achieve time-sensitive and cost-effective design, especially in a country that received 70% of its goods sold in 2014 by import (U.S. and Foreign Commercial Service). There isn't adequate industry existing in Haiti, so building design elements with natural materials is preferred.

-To allow for nighttime access to community gathering nodes like the visitor center and shower systems, solar panels added to community center natural material rooftops. Reinforced with steel where necessary on wooden structures for weight distribution, maintaining a level of aesthetic consistency coupled with sustainable technology.

-Mixed concrete to be used on vehicular road surfaces to ensure runoff to drainage ditches for maximum water collection.

-Construction along roadway must use silt screens along the entire length of construction, to prevent excess silt settlement loosening and movement into water bodies.

-21% slope area of journey, paved with large natural stones, to be preserved with safety precautions added as pedestrian challenge area and shortcut up steep slope and heavily used passage for locals.

-1 Large vehicle at a time at 20mph max speed to lower risk of accident and pedestrian ease of mind.

-Vehicular safety through widening and stabilization will be taken into consideration with guardrails and stabilized land edges to decrease erosion.

-Galvanized steel used for guard rails posted every 6' at steep road edge stabilized with vetiver.

-Existing height of dirt and stone wall at roadway cut back curve varies from 0 to 8ft along 1,510 ft.

long inclined road along 11.5% slope. Planted with vetiver grass to stabilize edge and allow for staircases to take you through the newly planted natural ravine in this area flowing down toward catchment system.

- Additional 8 ft. roadway cut back around steep elbow of sloped curve will further open view for greater field of view and added pedestrian safety. Added space will serve as resting space at widened pedestrian access

- Safety caution signs around curve alert to motorcycle pickup activity and alert drivers to curve.

Area serves as a covered learning space where in case of rain, people have shelter and an area to see beginning of storm water runoff on its way down this day-lighted and more heavily planted portion of the drainage canal. Vetiver plantings down slope and crushed gravel above grated system on roadway will be layers of filtration of waste materials.

- The western road of the fork north of the busy Route 41 is straightest and easiest access for vehicles, so would serve as the best location for the main Letan Bossier Agritourism Trail entrance. As road widening would allow access of large trucks in both directions, it would be best to add design guidelines to control the flow of traffic, as well as direction of traffic. Service vehicles need to be allowed only on the west side of the fork, and will be let in only one at a time, as to maintain a level of safety for pedestrians and motorcyclists along roadway where steep curves around mountain roads pose a safety hazard, although widening these roads reduces this hazard. Locals and stewards will be allowed to access both the east and western fork (see Figure 27 below).

- Enforce required use of visitor center parking lot across road from Mackandal Farm, to be sure only registered vehicles enter the area, and approved vehicles of registered guests are parked at center and not driven up toward Grand Basin (see Figure 28 below).

- Include cross walks to link Agricultural Trail with Proposed market (see Figure 29 below).

- Pedestrian and vehicular access will also be linked with the beachfront (see Figure 30 below).

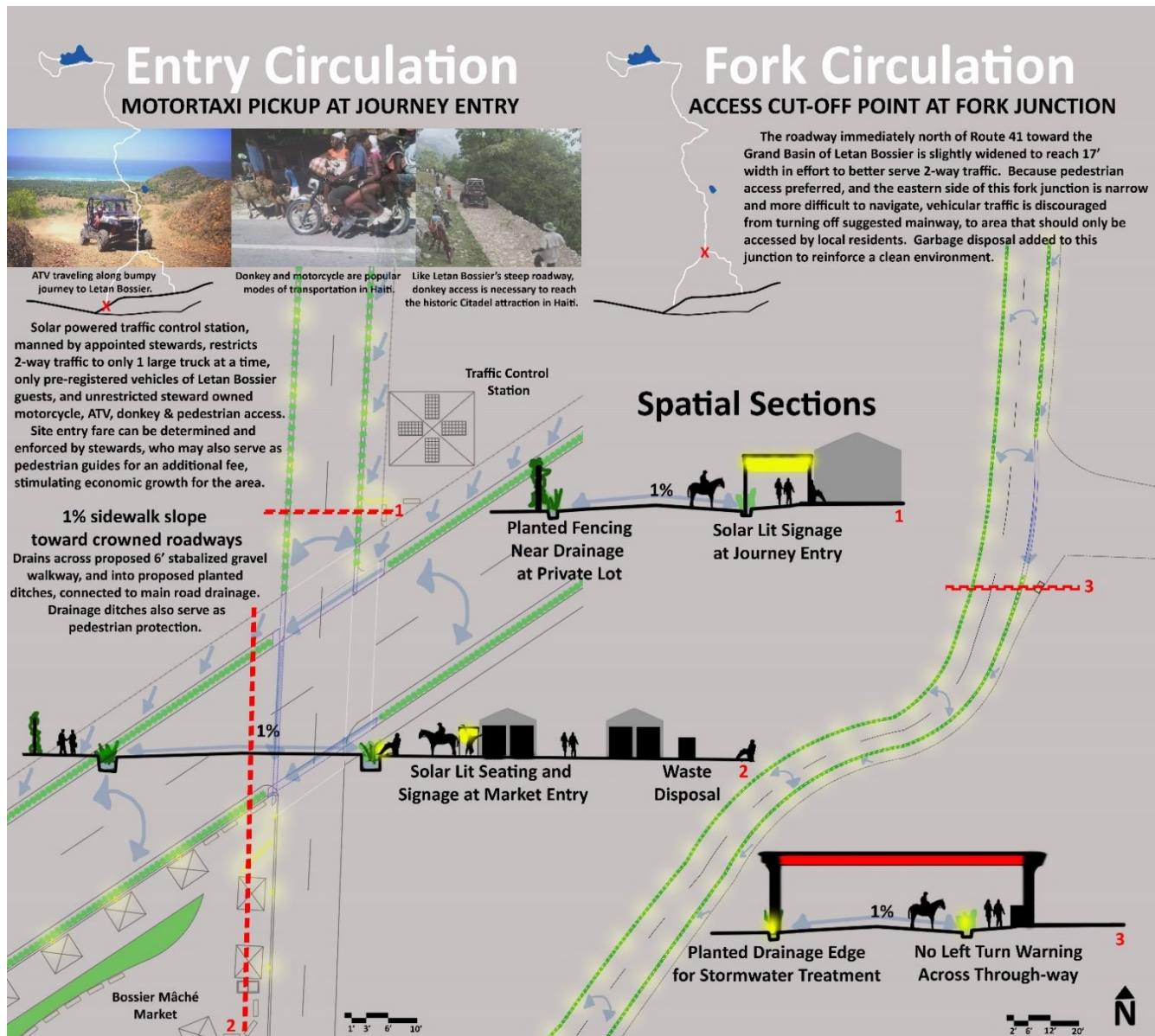


Figure 27. Proposed entry intersection connected to Highway 41 running East – West. Proposed market to the South and Letan Bossier journey access to the North. Appointed stewards will enforce vehicular restrictions as only local vehicles, approved commercial or service vehicles, and guests of Letan Bossier can access by car. Thresholds represented in yellow are welcome signs and red are restricted access. Guests are to use Western roadway to access the Grand Bassin, as the Eastern roadway is too narrow, winding, and disruptive to residents.



Figure 28. Guests of Letan Bossier can only drive up to designated parking lot where there is a guarantee that oily runoff from vehicles is trapped in gravel beneath turf stone, before it passes through layers of land and charcoal bamboo before being released into the tributary toward further filtration before reaching Lower Basin. Proximity to Mackandal Organik farm across the street ensures fresh fruit when available for the Kantina space at visitor entrance corner of parking lot. Pedestrian access separated by water and drought tolerant planted gullies. As roadway is along ridge, land beside it slopes off so constructed parking lot, using fill from the cut road, needs to have land stabilization cells that will be concealed by vetiver grass, which adds another line of defense against erosion. The parking lot's overflow runoff, like that of the Washing Station, will contribute to reforestation along nearby tributary leading to the nearby Lower Basin.



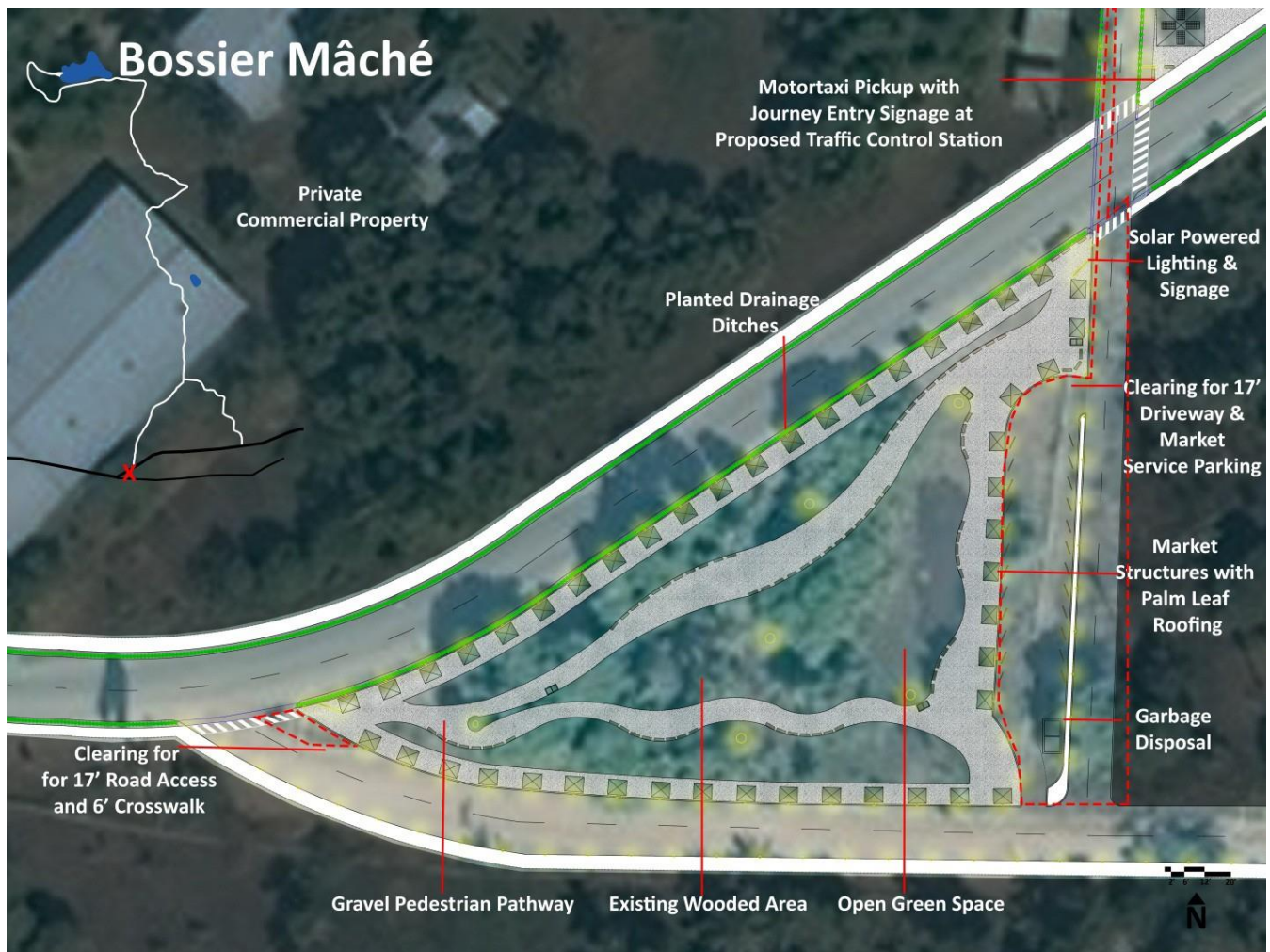


Figure 29. Proposed market space across Route 41 at journey entrance intersection. Locals mentioned inability to conveniently get goods to larger markets in the towns to the East and West of Bossier, but with increasing sustainable practices at Mackandal Farm, there is an opportunity to not only sell goods on site, but off site in this space, currently uninhabited by residents. There is an expected demand for supplies, food, beverages, and art in any Haitian market, especially those associated with a tourist attraction. This makes for provision to supply the demand for economic generation, along with 0% residential displacement. A North – South service roadway is proposed to be cleared to the immediate East of market so that locals have a clear crossing from Letan Bossier, and better circulation for expected trend of service vehicles gathering in an active space, as is the case in every major intersection or node in the region. Crosswalk stripping added at intersections to guide the pedestrian into the market during commute, as opposed to passing by it on along the roadway. Lighting, seating, and signage is located near individual market structures, pathways and intersections to gain the attention of passersby. Crushed gravel pathway winds through preserved existing vegetation for authenticity and a sense of refuge.



Figure 30. Proposed paving plan for pedestrian and vehicular access to beach. Vehicles cannot be allowed on sand of the beach, as not to contribute to runoff to sea, so cul-de-sac with central seating and crosswalk added to discourage further travel past beachfront businesses, but a cut-back in uninhabited land near residences necessary to allow vehicles along roadway while screening activity from residents with planted fencing. Pedestrian level lights added to guide the pedestrian to the open waterfront.

### 3.4 PHASE 4: AGRICULTURE – VEGETATION SCHEDULE AND BENEFITS

Foreword: Drought and lack of woodland preservation lead to the mass deforestation of Haiti's mountainsides, and this study aims to choose planting materials and define spaces where reforestation can be explored, while contributing to economic generation through education, reforestation, and nutrition.

#### 3.4.1 Issues Identified

Issues outlined are to be addressed, dealing with preservation of local agriculture through reforestation.

- No preservation plan of existing vegetation.

- No mention of preservation of historic structures associated with agricultural practices.

-Desire for visitor lodging surrounding the Grand Basin with no guidelines.

### **3.4.2 Solutions Applied**

Building policy and specifications – The number of built structures surrounding the basin, and location of each structure must be pre-approved by KOELB and respective government agencies prior to being finally approved by majority after a presentation to the Letan Bossier Stewardship Committee and local stakeholders. That agency will appoint an environmental specialist to determine the safety and possible fore-caution of planned development. If appropriate measures cannot be taken by that entity to fund needed adjustments, the development will not be approved.

Screening building/planting materials and specifications - Property owners and stewards along the main access-way have a choice of the following options for roadway buffer at their government granted/specified property line.

1. Low 3 ft. max height seating planted with edible/medicinal bushes only.
2. 4-5 ft. thatched vegetative fencing.
3. 5-6 ft. screen tree planting in front of gate structure.
4. 6-9 ft. cinderblock wall, government approved behind 25ft. road edge. All approved cinderblock walls will be beautified with artistic improvements from local artists. Mosaic or paint of any kind accepted, but must be pre-approved by KOELB.

Reforestation - In addition to preservation of existing vegetation of fruiting trees and sugarcane surrounding the Grand Basin, more fruiting trees like the 1000 mango species that exist today, over 100 of which thrive in Haiti, could be planted along the journey's pedestrian trails, leading to a more enjoyable and walkable experience, and also providing additional agricultural products to sell in the proposed Visitor Center, Grand Basin Market, and Bossier Mâché Market Space near the beach, opening possibilities for on-site, low-cost to fine dining options. Reforestation of agricultural materials will make for a lush walking experience through the plantings, also contributing to the educational portion of the journey, planting materials have been chosen that typically reproduce themselves and spread through animal feeding and runoff of seeds down the natural



tributary system. The bucket system of watering vegetation along heavily draining slopes is a technology already in place at Letan Bossier, administered by Justin Toussaint of Mackandal Organik Farm, who already serves as the appointed agricultural leader of the community. Using techniques to clone ornamental plants at Mackandal Organik Farm proves to be a promising way to spread plant materials around the Grand Bassin of Letan Bossier and to local residents for beautification purposes (see Figure 31 below). A major proposal for reforestation is to continue experimentation with plant species cloning, not only with ornamental, but with edible plantings.



Figure 31. Cloning of Croton at Mackandal Farm (left) and Breadfruit (right).

Proposed Planting List - The suggested plants in this pre-approved list are native species to Haiti, are long-standing non-native plants that are favored by locals, and/or were introduced to this area through known sources. The knowledge of these plants and their benefits came about through the palpable process of eating the plants and/or learning about their characteristics and benefits from the farmers and cooks themselves. Any plants other than those included on this list must be pre-approved by Justin Toussaint Mackandal Agricultural Farm as the chief agricultural researcher and manager. Proposed materials are hardy and sun loving plants who tolerate dynamic temperatures, drought and flood. Ornamental plants are proposed for beautification (see Table 1 below). Bushes and clumps are proposed for edge buffering (see Table 2 below). Fruit trees are proposed (see Table 3 below). Edible groundcovers are included (see Table 4 below). Reforestation trees are already popular in Haiti (see Table 5 below). Other popular Haitian medicinal plants are proposed (see Figure 6 below). Filtration and stabilization materials are proposed (see Table 7 below).

(Note: H=Height, S=Spread).

Table 1. Ornamental/Screening Plants.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Alpinia purpurata</i>	Flowering Ginger	Jenjanm	Edible Ginger Root	Inflammation, Digestion, Nausea	1'	H 4'
<i>Codiaeum variegatum pictum Craigii</i>	Croton	Croton	Fertilize 3 X year, with granular fertilizer. Water heavily during growing season.	Air Filtration	3'	H 10'

Table 2. Bushes and Clumps for Pedestrian Buffering.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Citrosa geranium</i>	Citronella Plant,  Mosquito Plant	Sitwonél	Purple flowering aromatic evergreen	Leaves can be rubbed on skin for mosquito repellent, to treat wounds, deodorant, fungicidal, anti-inflammatory, anxiety, and depression	1.5'	H 3'  S 2'
<i>Dietes iridioides</i>	African Iris	Iris Afriken	Strengthen perennial with regular water 1 <sup>st</sup> year to establish roots.	Deep roots are good for storm water filtration. Grows in very moist and dry conditions.	1'	H 3'



Table 3. Large Edible/Fruiting Shade Trees.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Citrus X sinensis</i>	Citrus	Zoranj	Introduced by LSU Plant, Environmental and Soil Sciences	Fruit rich in Vitamin C to increase immune system function.	25'	H 30' S 30'
<i>Mangifera indica</i>	Haitian Mango	Madame Francis Haitian Variety	Non-native but most popular species for agricultural export in Haiti. Ripe May-July.	Antioxidant can protect against cancers, and contribute to health of skin, eye, and digestion.	30'	H 130' S 33'
<i>Carica papaya</i>	Papaya	Papaye	Large Bush/Small Tree with Canopy	Asthma symptom reduction, Antiseptic, Swelling.	6'	H 12' S 7'
<i>Artocarpus altilis</i>	Bread Fruit	Lam veritab	Fruit can be eaten fried or boiled	Rich in carbs, antioxidant dietary fiber, Potassium, and Vitamins.	15'	H 50'
<i>Musa X paradisiaca</i>	Plantain	Bannann	Small Tree	Rich in Vitamins A and C, Potassium, and Fiber.	4'	H 10' S 4'
<i>Prunus dulcis</i>	Almond Tree	Zanmann	Deciduous Tree produces nuts after 3 <sup>rd</sup> year.	Rich in fat, protein, nutrients, and vitamins.	12'	H 20' S 15'
<i>Annona reticulate</i>	Custard Apple	Kachiman	Sweet custard-like fruit eaten fresh, mixed in drinks or ice cream. Native to Thailand thriving in Haiti.	Vitamins A, C, Antioxidants, Calcium, Copper and many other nutrients. Strengthen immune system and fight disease.	6'	H 35' S 20'

Table 4. Edible Groundcovers/Staked Screen Plants.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Ipomea batatas</i>	Sweet Potato	Patate	Can be planted with other yam varieties.	Anti-oxidants treat diabetes and heart disease.	1'	H 1'
<i>Solanum lycopersicum</i>	Haitian Tomato	'Plate de Haiti'	Interdeterminate Perennial that must be heavily staked for fencing, but will produce fruit until the first frost. Trim regularly to revive.	Anti-oxidants can combat cell damage.	3.5' spacing along fencing	H 3' w/ Fence
<i>Saccharum officinarum</i>	Sugar Cane	Kan	Running/ Spreading Variety. Should be contained in moist areas if spread is not wished.	Alkaline forming food with calcium, potassium, iron, and magnesium	4.5'	H 10'

Table 5. Popular Invasive Shade Tree Species Currently Used for Reforestation in Haiti.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Senna siamea</i>	Siamese Cassia	Kassod Tree	Fastest growing in reforestation.	Used for cooking.	6'	H 50'
<i>Prosopis Juliflora</i>	Prosopis	Bayawonn	Spread by animals who eat pods.	Charcoal production.	6'	H 50'
<i>Leucanea leucephala</i>	Lead Tree	Madlèn	Spread by cattle who eat pods.	Cattle feeding.	6'	H 50'
<i>Paulownia tomentosa</i>	Empress Tree	Common	Full sun deciduous – pink. Introduced by Timber Reintro. Program-(HTRIP).	Fast spreading invasive shade tree for reforestation.	12'	H 60' S 40'

Table 6. Other Haitian Medicinal Plants.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Moringa olifera</i>	Moringa, Drum stick Tree	Benzolive	Cultivated at Mackandal Farm.	Antioxidants, anti-inflammatory, lower pressure.	10'	H 40' S 20'
<i>Azadirachta indica</i>	Neem Tree	Nimtree	Currently being cultivated at Mackandal Organik Farm.	Insect repellent. Used to treat many conditions resulting from inflammation. Blood sugar regulator, resulting in weight loss.	13'	H 66' S 50'

Table 7. Materials for Land Stabilization, Water and Roadway Edges, and Storm Water Filtration.

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Xantiosoma sagittifolium</i>	Elephant Ear	Malanga	Elephant ear-like plant, large leaf plant with edible potato-like cormels that grow near the surface at the root. Prefers dry conditions.	Phytoremediation of waterways through roots and stems. Boil leaves and/or cormels containing fiber and nutrients for blood pressure, energy, and reduction of allergy symptoms.	6'	H 15' S 10'
<i>Equisetum giganteum</i>	Large Horsetail Species	Prèl	Height varies based on water exposure.	Phytoremediation through semi-permeable road edges planted with horsetail.		H 6.5-16'

(Table 7 continued)

Scientific Name	English Name	Kreyòl Name	Notes	Uses	Spacing	Size
<i>Guadua angustifolia</i>	Guadua Bamboo	Banbou	Non-evasive Clumping Bamboo	Toxin absorbency through charcoal bamboo or root filtration. Strong wood for building.	16'	H 62'
<i>Vetiveria zizanioides</i> , 'Sunshine' Vetivergrass Chrysopogon zizanioides (L.) Roerty	Sunshine Vetiver Grass	Vetivè	Poor soil and Salt-tolerant variety. Crown rises w/ sediment. Roots grow straight down and can reach a length of 22'. Brick cells only necessary at constructed land edge.	Proposed use within stabilization cells at newly constructed land, sediment filtration at water-ways, and metal degradation.	.5' spacing in single row within cells. Rows 3' apart.	1x1' in proposed brick cells.

## CHAPTER 4: THE MASTER PLAN

### 4.1 MASTER PLAN SUMMARY

The proposed master plan is a sophisticated circulation plan to guide the visitor through an organization of programmed spaces, pointing out agricultural and historical significance, as well as environmental and access safety precautions like garbage disposal and parking restrictions (see Figure 32 below). Artful and authentic way-finding and educational boards will be permanently added through lit signage, placed in appropriate spaces at the appropriate size for that area.

There will be seating areas strategically placed at widened areas along roadway, providing viewpoints, giving the opportunity for community gathering nodes, highlighted local customs of motorbike taxis, discouraging necessity of vehicle access, and inspiring visitors to contribute to the local economy by utilizing local motor taxis as the locals do. These stops will increase economic gain for riding locals, interest in picture points, historical lessons, and views.

A major design goal was to decrease pollution from human activity and take steps to prevent polluted water from entering groundwater sources and basins. It is understood that pollution cannot be totally eradicated, but as we saw in the case of the Cholera Epidemic of 2010, where design guidelines for waste disposal are lacking, opportunities for water pollution are greater. Negative contributions to the environment from outside sources could threaten the safety of the people and environment as a whole. Steps must be taken for positive impact.



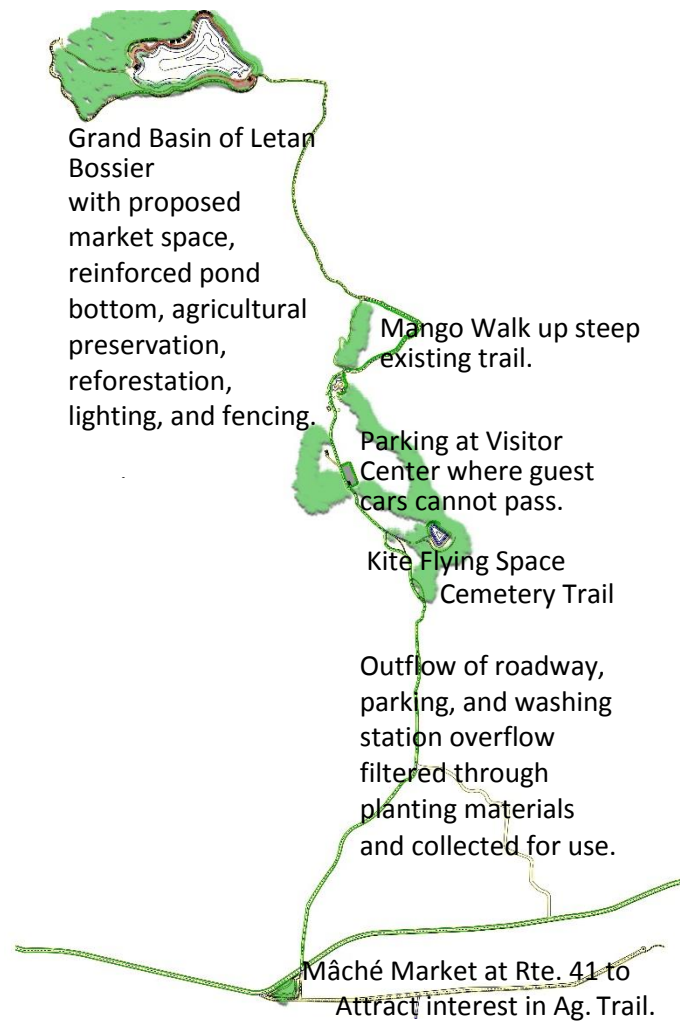


Figure 32. Descriptive overall access scheme showing flow of spaces and major issues addressed.

Research will continue to be conducted and applied to site improvement, and when final programming decisions are agreed upon by the community and government, form code and design guidelines will be enforced by the appointed stewards, aiming to protect the local residents from overdevelopment of the natural environment they've grown accustomed to.

## 4.2 CONCLUSION

The overall master plan phasing must be implemented in the order of appearance from this report, which is a direct reflection of hierarchy of importance expressed by the community; local stewardship guideline enforcement, best storm water management practices, safe access measures, and reforestation through viable

materials of importance to locals and visitors. These issues have been listed in a hierarchy to put into perspective a realistic completion plan, given government permission and adequate investment.

The simplicity of the design solutions can be attributed to the narrowing down of the core needs of the community, and expectation of funding from the United Nations World Tourism Organization. The application of sustainable solutions that address community needs first, is pivotal to the long-term success of this space. It is anticipated that the local government will continue to pull ideas from this document for their continued redevelopment of this, and other projects around the South-East Region of Haiti. It is with great hopes that the parties involved will be influenced to implement long-term enforcement of the maintenance, design and safety guidelines specified in this document. Continued community building is expected, as the previously stifled voices of the Letan Bossier stewards and stakeholders are being heard.

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## **VITA**

Kristen Maria Lonon is from New Orleans, Louisiana. In May of 2011, she graduated from Louisiana State University with a Bachelor's Degree from the Robert Reich School of Landscape Architecture, and a minor in Communication Studies. From this point, she used her skills in community engagement to contribute to improvement of her hometown's socio-economic infrastructure, through real estate sales, field research, facilitation of design charrettes, and practical design applications. Kristen anticipates receiving her Master's Degree of Landscape Architecture in August of 2016. It is with great hope that Kristen can continue her work to educate and exchange with people of all communities on their power to influence the built environment.